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ECONOMIC ANALYSIS
OF
INTERSTATE HIGHWAY ROUTINGS
FROM
CUSTER
TO
ROSEBUD COUNTY LINE

PREPARED BY

PLANNING SURVEY DIVISION

AND

INTERSTATE DIVISION

OF

MONTANA STATE HIGHWAY COMMISSION

IN COOPERATION WITH

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HYSHAM HILLS VICINITY

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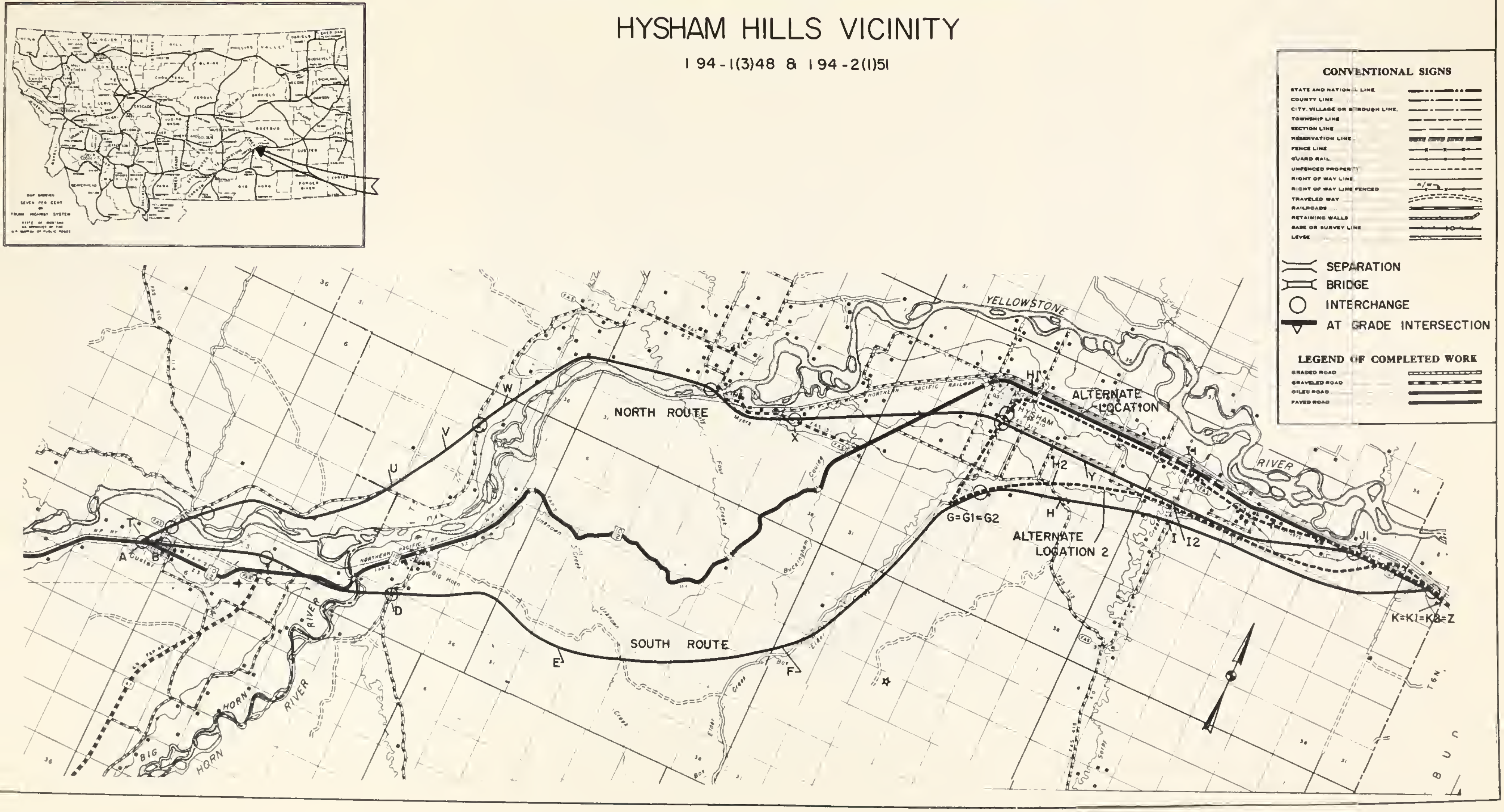

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ECONOMIC ANALYSIS OF ALTERNATE LOCATIONS
FOR INTERSTATE HIGHWAY NO. 94
BETWEEN CUSTER AND THE TREASURE-ROSEBUD COUNTY LINE

FOREWORD

This report has been prepared for the purpose of comparing the relative merits of two proposed alternate locations of Interstate Highway No. 94 from a point on the present highway west of the community of Custer eastward through the Hysham area to another point on the present highway near the Treasure-Rosebud county line.

This report attempts to describe as much as possible all of the features that apply to each of the proposed routes; however, principal emphasis is granted to an analysis of the routes as they affect the highway user. Two separate types of costs are involved in highway transportation: the cost of constructing and maintaining the necessary highway facilities, and the cost of operating motor vehicles over these highways. All of these costs are borne almost entirely by the highway user; either in taxes paid at the Federal and State level for highway construction and maintenance or in operating costs for moving his vehicle over the highway. It is evident, therefore, that the interests of the highway user must be given major consideration in the selection of the most beneficial routing.

In general terms, the most beneficial location from the standpoint of the highway user would be the route which involves the lowest overall total of construction, maintenance and vehicle operating costs. This would be the most economical highway location to the highway user.

The value of the route may also be considered in terms of the benefit/cost ratio. This ratio reveals the relationship between the costs of constructing and maintaining the highway facilities and the corresponding benefits to the motorist in improved vehicle operating conditions as compared to the present facilities.

DESCRIPTION OF ROUTES

In the interest of simplicity, these routes are identified in relation to their general location as the North Route and the South Route. In the vicinity of Hysham, there are two alternate locations for the South Route, and these are identified as Alternate No. 1 and Alternate No. 2.

The North Route begins at a common terminus at a point on the present highway about one-half mile west of Custer (pop. 275). From this point the route extends in a northeasterly direction to a crossing of the Yellowstone River. On both sides of this bridge, interchanges are planned to permit access to local roads in this vicinity.

The route continues in a northeasterly direction across a bench of dry-land farming and grazing land. It then descends to the irrigated

valley of the Yellowstone River. At the point of intersection with the present county road, an interchange is located to separate the Interstate highway from this road and to permit access to the Interstate highway.

This route continues across the fertile river valley to a point near Myers (pop. 20) where another interchange is located for the service of a substantial amount of traffic originating in this area. The route then crosses the Yellowstone River again at a point near the existing bridge and extends a short distance to a point of intersection with FAS Route 311. Another interchange is located at this intersection.

From this point, the route extends across the present highway to another interchange which is located at the intersection with FAS Route 312 about one mile south of Hysham. This interchange will separate the Interstate highway from FAS Route 312 and it will provide access to the city of Hysham (pop. 410).

Beyond this point, the route continues in an easterly direction on alighment about one mile south of the present highway to the eastern terminus at a point on the present highway about 2 miles west of the Treasure-Rosebud county line. From the Hysham interchange to the eastern terminus, the route traverses irrigated and well developed farming land.

The total length of the North Route is 31.2 miles, including 1.3 miles of four-lane highway which is required because of steep grades encountered in the ascent from the river valley to the benchland.

This route has the advantage that it is the shortest of all alternates considered and it would be located at water-level grade for the major part of its length. It also has the advantage that it would serve a substantial volume of traffic to and from the Myers area which is now using highway facilities inferior to the Interstate highway.

Principal disadvantages include the crossing of a substantial amount of well developed and irrigated farming land. The grading would also be rather costly because of the necessity for hauling in a large amount of fill material.

The South Route begins at the same western terminus. It would pass along the north edge of Custer and follow a location a short distance to the north of the present highway east of Custer. An interchange would be located at the edge of Custer to serve that community, and another interchange would be located at a point of connection with an extension of Montana Highway No. 47 which leads to Hardin. From Custer to Montana Highway No. 47 the route is located through level terrain for the most part. Between Montana 47 and the Big Horn River, the route crosses a small bench. Another interchange will be located at the intersection with a county road south of the community of Big Horn.

East of Big Horn, the South Route commences to climb out of the river valley in the ascent to the summit of a range of hills known as the "Hysham Hills". In crossing these hills, some difficult grading will be encountered and numerous grades as high as 5% will require some construction to four-lane standards in order to provide proper passing opportunities.

After descending from these hills the route approaches the city of Hysham. The nearest approach is located at a point about 2.5 miles south of the city. An interchange will be located at this point to permit access to the city. It will be necessary to construct about 2.5 miles of connecting road between the interchange and the city.

From the Hysham interchange to the eastern terminus, the South Route is located on a line which crosses moderately rolling terrain, consisting of grazing land.

The length of the South Route is 32.3 miles. About 5.2 miles of four-lane highway will be involved in the crossing of the Hysham Hills.

This route has the advantage that there is a minimum of disruption of developed land. It will also provide a direct connection to Montana Highway No. 47, a feature which is lacking on the North Route. Principal disadvantages include the extra length of 1.1 miles as compared with the North Route, the numerous grades encountered in crossing the Hysham Hills, and the less direct service to Hysham.

From a point south of Hysham to the eastern terminus, there are two alternates to the South Route. Alternate No. 1 leaves the South Route at a point about 2.5 miles south of Hysham and extends in a northerly direction to a point near the south limits of the city. An interchange will be located at this point to permit access to the city. The route would then continue to a point just south of the present highway where it would turn and continue eastward on a line parallel to and a short distance south of the present highway. This route was selected in the attempt to provide better service to Hysham by carrying the Hysham-bound traffic as close to the city as possible on the Interstate highway. The length is 33.5 miles with 5.2 miles of four-lane highway.

The Alternate Route No. 2 was selected with the thought of placing the route on a line which is located at the edge and generally out of the rolling terrain which is crossed by the South route between the Hysham interchange and the eastern terminus. This location would simplify construction, but it would affect some of the developed farm land through this region. The length is 32.4 miles with 5.2 miles of four-lane highway.

The locations of these routes and the alternates are shown on the map in the front of this report.

CONSTRUCTION COSTS

Tables in the section following this narrative show the estimated construction costs for each route grouped by principal items. These tables show the following totals for construction costs for each route:

North Route	$9,684,000
South Route	7,755,000
South Alternate # 1	8,487,000
South Alternate # 2	8,267,000

These costs must be supplemented by the cost of constructing the connecting road to Hysham which is involved in all routes with the exception of South Alternate No. 1 which is located on the edge of the city. The cost of the connecting road is $50,000 for the North Route and $156,000 for the South Route and South Alternate No. 2.

With the addition of these connecting roads, the total construction costs become:

North Route	$9,734,000
South Route	7,911,000
South Alternate # 1	8,487,000
South Alternate # 2	8,423,000

Since different construction items have different service lives, it is necessary to convert these total costs to annual costs in order to make a more valid comparison of the relative standings of these routes. The following table shows the results of these conversions:

CONVERSION OF TOTAL CONSTRUCTION COSTS
to ANNUAL CONSTRUCTION COSTS

		NORTH ROUTE		SOUTH ROUTE	
CONSTRUCTION ITEM	YEARS OF LIFE	TOTAL COST	ANNUAL COST	TOTAL COST	ANNUAL COST
Grading & drainage	40	$2,645,000	$ 66,125	$2,755,000	$ 68,875
Surface & base	20	2,269,000	113,450	2,275,000	113,750
Structures	50	2,762,000	55,240	1,280,000	25,600
Miscellaneous	30	349,000	11,633	214,000	7,133
Right-of-Way	50	449,000	8,980	231,000	4,620
Engineering and utilities	40	1,210,000	30,250	1,000,000	25,000
Subtotal		9,684,000	285,678	7,755,000	244,978
Connecting road	30	50,000	1,667	156,000	5,200
TOTAL		$9,734,000	$287,345	$7,911,000	$250,178

		SOUTH ALTERNATE # 1		SOUTH ALTERNATE # 2	
CONSTRUCTION ITEM	YEARS OF LIFE	TOTAL COST	ANNUAL COST	TOTAL COST	ANNUAL COST
Grading & drainage	40	$2,796,000	$ 69,900	$3,060,000	$ 76,500
Surface & base	20	2,508,000	125,400	2,311,000	115,550
Structures	50	1,392,000	27,840	1,294,000	25,880
Miscellaneous	30	172,000	5,733	218,000	7,267
Right-of-way	50	566,000	11,320	311,000	6,220
Engineering and utilities	40	1,053,000	26,325	1,073,000	26,825
Subtotal		8,487,000	266,518	8,267,000	258,242
Connecting road	30	- - -	- - -	156,000	5,200
TOTAL		$8,487,000	$266,518	$8,423,000	$263,442

The following table shows the estimated cost of maintaining the Interstate highway under the alternate routing proposals:

ANNUAL MAINTENANCE COST
FOR INTERSTATE HIGHWAY

	2 LANE ROAD AT $1,500 PER MILE		4 LANE ROAD AT $2,500 PER MILE		
	MILES	COST	MILES	COST	TOTAL ANNUAL COST
North Route	29.9	$44,850	1.3	$ 3,250	$ 48,100
South Route	27.1	40,650	5.2	13,000	53,650
South Alternate # 1	28.3	42,450	5.2	13,000	55,450
South Alternate # 2	27.2	40,800	5.2	13,000	53,800

The combined annual cost of constructing and maintaining the Interstate Highway for each routing is shown below:

	ANNUAL CONSTRUCTION COST	ANNUAL MAINTENANCE COST	TOTAL ANNUAL COST
North Route	$287,345	$48,100	$335,445
South Route	250,178	53,650	303,828
South Alternate # 1	266,518	55,450	321,968
South Alternate # 2	263,442	53,800	317,242

These computations show that the South Route would be the most favorable from the standpoint of annual construction and maintenance costs applying to the Interstate System facilities. It is assumed that regardless of the Interstate routing the present highway and the other roads in this vicinity will be kept in operation for the use of traffic which cannot use the Interstate highway. Under these conditions, the maintenance costs of these existing facilities would be the same for all of the alternate routes; therefore, these costs are not included as part of this analysis.

TRAFFIC SERVICE

Two principal categories of traffic would be affected by the location of the Interstate highway through this area. The traffic using present U.S. Highway No. 10 would be the largest group and the one that would be most affected by the location of the Interstate highway. A second group of lesser importance includes the traffic originating in the farming area near Myers and now using county roads or FAS Route 311 for a substantial portion of its travel.

On the basis of origin-destination surveys taken on highways in this vicinity, together with turning movements at principal road intersections, it is possible to analyze the effect which each of the alternate routes would have on travel throughout this region. The principal features involved are described below:

1. The North Route would be of considerable value to the traffic now using county roads and FAS Route 311 on the north side of the Yellowstone River. This traffic would be able to use the higher standard Interstate facilities in place of the present facilities in travel to Hysham and points east or to Custer and points west. For travel to the west there would be a substantial savings in distance as compared with the present routing via FAS Route 311 to U.S. Highway No. 10 and then west to Custer or other places. The South Route or its alternates would be of only minor benefit to this traffic.

2. Through traffic, with origins and destinations west of Custer and east of Sanders, would find it desirable to use either of the alternate routes.

The North Route would provide the greatest benefit because of its shorter travel distance for this through traffic.

3. Trips with origins and destinations in Hysham would generally find that the North Route or the South Alternate Route No. 1 would be most beneficial for the reason that they would be able to use Interstate facilities for a greater proportion of the travel to this place. This benefit would vary somewhat depending on the point of origin of the trip.

4. Trips connecting with Montana Highway No. 47 would be served only by the South Route or its alternates. If the North Route were to be built, trips from Montana Highway No. 47 would have to continue to use the present highway for travel to the east or to the west.

5. There is a substantial amount of traffic of local generation and local circulation that would not be able to obtain access to the Interstate system because of the location and spacing of the interchanges. Such traffic would continue to use present facilities and would not benefit from the location of any of the alternate Interstate routings.

The assignment of traffic to the alternate routes under various conditions is shown in the computation of vehicle operating costs in the following section.

VEHICLE OPERATING COSTS

If there was no variation in the cost per vehicle mile for operating motor vehicles over different types of highways and roads, the total vehicle miles of traffic for each alternate route would be a measure of the relative standing of the routes insofar as traffic service is concerned. It is well known, however, that there is considerable variation in vehicle operating costs depending on the type of surface, grades, curvature, congestion and similar features. Typical operating costs are reported in a publication of the American Association of State Highway Officials for use in analyses of this type. These costs have been used as a base figure, with proper adjustment being made for the increased price of motor fuel in Montana.

The adjustment of these figures amounts to the following operating costs per vehicle mile for the various road types involved in this analysis:

Interstate highway	$.1345 per vehicle mile
Primary highway - PTW	.1504 per vehicle mile
Secondary highway - PTW	.1630 per vehicle mile
County roads	.1813 per vehicle mile

The oiled approach roads which are planned for connections to Hysham have been assigned the same unit operating costs as a Primary highway. The above costs include the operating costs of both passenger cars and trucks.

There are numerous grades which occur on about 5 miles of the South Route in the section over the Hysham Hills. The AASHO publication suggests that the operating costs be increased where the grades exceed 3%. The average of the grades in this section amounts to 1.4%, therefore the increased costs have not been applied to the South Route. A compensating feature also occurs in that 4-lane highway is planned throughout this section and the extra benefits of a divided highway would tend to offset any increased cost produced by gradient.

The following table shows the assignment of traffic under each routing, the annual vehicle miles of traffic, and the annual vehicle operating costs for traffic presently using U.S. Highway No. 10:

	AVERAGE DAILY TRAFFIC	MILES	DAILY VEHICLE MILES	ANNUAL VEHICLE MILES	TYPE OF FACILITY	COST PER VM	TOTAL ANNUAL COST
Present conditions	1,139	34.0	38,726	14,134,990	Primary	$.1504	$2,125,902
North Route	1,003	31.2	31,294	11,422,310	Inter.	.1345	1,536,301
	131	34.0	4,454	1,625,710	Primary	.1504	244,507
	310	1.1	341	124,465	Approach	.1504	18,720
Total				13,172,485		.1366	1,799,528
South Route	1,011	32.3	32,655	11,919,075	Inter.	.1345	1,603,116
	114	34.0	3,876	1,414,740	Primary	.1504	212,777
	55	3.0	165	60,225	Approach	.1504	9,058
Total				13,394,040		.1363	1,824,951
South Alternate # 1	1,019	33.5	34,137	12,460,005	Inter.	.1345	1,675,871
	108	34.0	3,672	1,340,280	Primary	.1504	201,578
	162	0.8	130	47,450	Approach	.1504	7,136
Total				13,847,735		.1361	$1,884,585

Since there would be no measurable difference in traffic service between the South Route and the South Alernate Route No. 2, the same operating costs have been assigned to both routes.

As previously explained, the North Route has an advantage that it would permit traffic on the north side of the Yellowstone River to use an Interstate highway for part of the travel in place of lower standard existing roads. The following table shows the operating costs under present conditions and with the usage of the North Interstate Route:

	AVERAGE DAILY TRAFFIC	MILES	DAILY VEHICLE MILES	ANNUAL VEHICLE MILES	COST PER VEH. MILE	TOTAL ANNUAL COST
Present conditions:						
On county roads	20	10.5	210	76,650	$.1813	$13,897
On Secondary roads	50	9.7	485	177,025	.1630	28,855
On Primary roads	178	4.0	712	259,880	.1504	39,086
Total			1407	513,555	$.1594	$81,838
With North Route	73	18.1	1321	482,165	$.1345	$64,851

This table shows that the North Route would reduce the annual vehicle-miles of travel from 513,555 under present conditions to 482,165 with usage of the Interstate highway. This reduction occurs because of the shortening of travel distance with usage of the Interstate highway. The unit operating costs would also be lower over the Interstate highway and these features would reduce the total operating costs from $81,838 under present conditions to $64,851 with usage of the Interstate highway.

Since the South Route and its alternates would not serve this traffic on the north side of the river, there would be no change from present operating conditions and costs with these proposed routings.

The following summary table shows the total operating costs under present conditions and with the completion of the various alternate routes:

	TRAFFIC NOW USING US #10	AFFECTED TRAFFIC OFF US #10	ALL TRAFFIC
Present conditions:			
Annual VM of traffic	14,134,990	513,555	14,648,545
Annual operating costs	$2,125,902	$81,838	$2,207,740
North Route:			
Annual VM of traffic	13,172,485	482,165	13,654,650
Annual operating costs	$1,799,528	$64,851	$1,864,379
South Route:			
Annual VM of traffic	13,394,040	513,555	13,907,595
Annual operating costs	$1,824,951	$81,838	$1,906,789
South Alternate # 1:			
Annual VM of traffic	13,847,735	513,555	14,361,290
Annual operating costs	$1,884,585	$81,838	$1,966,423
South Alternate # 2:			
Annual VM of traffic	13,394,040	513,555	13,907,595
Annual operating costs	$1,824,951	$81,838	$1,906,789

The analysis of traffic service and operating costs shows that the North Route would be most favorable in both operating costs and a lower quantity of vehicle miles of travel. This condition occurs principally because the route is at least 1.1 mile shorter than any other route and also because it serves traffic on the north side of the river which would not be benefited under any of the southern routings.

SUMMARY

This analysis shows that the South Route would have the lowest annual cost for constructing and maintaining the Interstate highway and that the North Route would have the lowest annual vehicle operating costs. The composite comparison of all costs involved is shown below:

	ANNUAL CONSTRUCTION COSTS	ANNUAL MAINTENANCE COSTS	ANNUAL OPERATING COSTS	TOTAL OVERALL COSTS
NORTH ROUTE	$287,345	$48,100	$1,864,379	$2,199,824
SOUTH ROUTE	250,178	53,650	1,906,789	2,210,617
SOUTH ALTERNATE # 1	266,518	55,450	1,966,423	2,288,391
SOUTH ALTERNATE # 2	263,442	53,800	1,906,789	2,224,031

This table shows that, when all costs are taken into consideration, all routes are in rather close agreement. The North Route has the lowest total cost of $2,199,824 per year as compared with $2,210,617 for the South Route. This amounts to a ratio of only 1.0049 in favor of the North Route.

When the vehicle operating costs for each route are compared with the operating costs under present conditions, the following savings, or benefits, are derived:

	Present Conditions	New Conditions	Benefits
North Route	$2,207,740	$1,864,379	$343,361
South Route	$2,207,740	$1,906,789	$300,951
South Alternate # 1	$2,207,740	$1,966,423	$241,317
South Alternate # 2	$2,207,740	$1,906,789	$300,951

On dividing these benefits by the corresponding construction and maintenance costs for each alternate route, the following benefit/cost ratios are obtained:

North Route $\frac{\text{Benefits}}{\text{Costs}}$ $\frac{\$343,361}{\$335,445}$ Ratio = 1.0235

South Route	Benefits	$300,951	Ratio = 0.9905
	Costs	$303,828	
South Alternate # 1	Benefits	$241,317	Ratio = 0.7495
	Costs	$321,968	
South Alternate # 2	Benefits	$300,951	Ratio = 0.9486
	Costs	$317,242	

The comparison of benefit/cost ratios shows that the North Route also has the most favorable rating, being 1.0235 as compared with 0.9905 for the South Route and somewhat lower values for the alternates to the South Route.

The benefits shown above are based on savings to present traffic volumes. During the estimated service lives of these highways, the traffic could be expected to double as an average for the period. This would result in a corresponding doubling of the benefits and also doubling of the benefit/cost ratios. These values would then become 2.0470 for the North Route, 1.9810 for the South Route, 1.4990 for the South Alternate # 1 and 1.8972 for the South Alternate # 2.

CONCLUSIONS:

From the standpoint of total costs and also the benefit/cost ratio, the North Route has the most favorable rating. It should be pointed out, however, that the margin in favor of this route on either basis is quite minor. A differential of this amount is not conclusive, especially when it is understood that much of the data reported herein are based on estimates which could have an inherent error greater than the differential between these routes.

From the standpoint of the highway-user, it would appear that any of these routes would be suitable, with the possible exception of the South Alternate # 1. This route was located as close as possible to Hysham with the thought that this location could be justified to serve better the traffic moving to and from that city. The analysis shows, however, that the benefit to Hysham-bound traffic would be more than offset by the extra travel which this route would involve on the part of the remaining traffic which does not wish to visit Hysham.

In a general comparison between the North Route and the South Route, it should be pointed out that, although there is very little differnce between the ratings for these routes from the standpoint of the highway-user, there is considerable difference between the routes in the type of land that would be required for right-of-way purposes. The North Route would cross a substantial amount of irrigated land west of Myers and south and east of Hysham. The South Route would be located almost entirely in lower standard grazing land. From the standpoint of the landowner, it would appear that the South Route would be the preferred location.

HYSHAM HILLS VICINITY

NORTH ROUTE

PRELIMINARY COST ESTIMATE

Section	T - U	U - V	V - W	W - X	X - Y	Y - Z					TOTAL
Length	6.1	1.8	1.3	6.9	6.4	8.7					31.2
Number of Lanes	2	2	4	2	2	2					
ITEM	COST (1,000 DOLLARS)										
Utility Adjustments	4	--	1	5	3	7					20
Grade & Drain	546	181	316	725	408	469					2,645
Base & Surfacing	386	112	145	514	468	644					2,269
Railroad Grade Separations	162	--	--	88	--	--					250
Highway Grade Separations	--	--	--	--	142	--					142
Interchanges	319	--	221	249	166	128					1,083
Bridges	455	--	--	669	90	43					1,287
Miscellaneous	76	53	28	60	59	73					349
Subtotal of Construction	1,948	346	711	2,340	1,336	1,364					8,045
Preliminary Engineering	94	17	34	112	64	65					386
Construction Engineering & Contingencies	195	34	71	234	134	136					804
Right of Way	94	8	9	127	116	95					449
Total Estimated Cost	2,331	405	825	2,813	1,650	1,660					9,684

HYSHAM HILLS VICINITY

PRELIMINARY COST ESTIMATE

SOUTH ROUTE

Section	A - B	B - C	C - D	D - E	E - F	F - G	G - H	H - I	I - K		TOTAL
Length	0.530	2.311	3.126	3.389	5.170	3.560	4.866	2.673	6.731		32.356
Number of Lanes	2	2	2	2	4	2	2	2	2		
ITEM	COST (1,000 DOLLARS)										
Utility Adjustments	--	18	--	--	--	--	--	--	--		18
Grade & Drain	15	328	413	132	793	122	293	221	438		2,755
Base & Surfacing	39	145	196	210	579	221	302	166	417		2,275
Railroad Grade Separations	--	--	--	--	--	--	--	--	--		--
Highway Grade Separations	--	--	--	--	--	--	--	129	--		129
Interchanges	--	158	124	138	--	--	162	--	134		716
Bridges	--	--	354	--	--	38	--	43	--		435
Miscellaneous	2	16	12	13	58	23	29	16	45		214
Subtotal of Construction	56	665	1,099	493	1,430	404	786	575	1,034		6,542
Preliminary Engineering	3	32	53	24	69	19	38	28	50		316
Construction Engineering & Contingencies	5	66	110	50	143	52	79	57	104		666
Right of Way	47	76	30	16	9	12	11	13	17		231
Total Estimated Cost	111	839	1,292	583	1,651	487	914	673	1,205		7,755

HYSHAM HILLS VICINITY

PRELIMINARY COST ESTIMATE

SOUTH ROUTE
ALTERNATE LOCATION 1

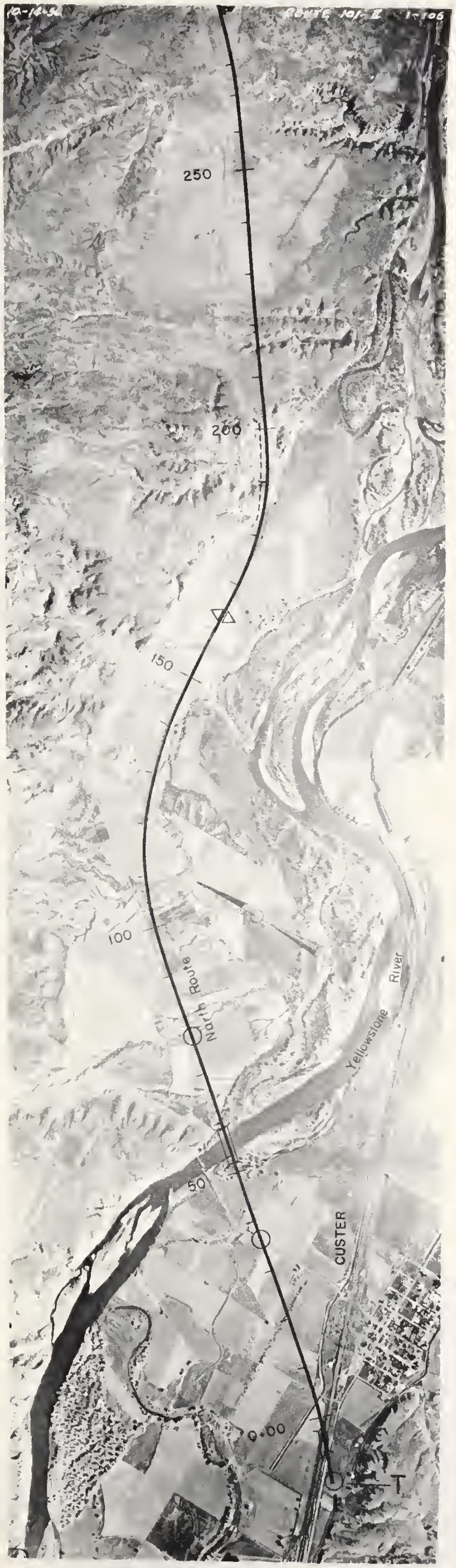
Section	A - B	B - C	C - D	D - E	E - F	F - G	G1 - H1	H1 - I1	I1 - J1	J1 - K1	TOTAL
Length	0.530	2.311	3.126	3.389	5.170	3.560	5.387	3.807	3.987	2.236	33.503
Number of Lanes	2	2	2	2	4	2	2	2	2	2	
ITEM	COST (1,000 DOLLARS)										
Utility Adjustments	--	18	--	--	--	--	1	2	--	--	21
Grade & Drain	15	328	413	132	793	122	320	272	244	157	2,796
Base & Surfacing	39	145	196	210	579	221	409	278	291	140	2,508
Railroad Grade Separations	--	--	--	--	--	--	--	--	--	--	--
Highway Grade Separations	--	--	--	--	--	--	--	96	58	--	154
Interchanges	--	153	124	138	--	--	193	--	--	149	762
Bridges	--	--	354	--	--	38	--	61	23	--	476
Miscellaneous	2	16	12	13	58	23	16	11	14	7	172
Subtotal of Construction	56	665	1,099	493	1,430	404	939	720	630	453	6,889
Preliminary Engineering	3	32	53	24	69	19	45	35	30	22	332
Construction Engineering & Contingencies	5	66	110	50	143	52	94	72	63	45	700
Right of Way	47	76	30	16	9	12	132	93	97	54	566
Total Estimated Cost	111	839	1,292	583	1,651	487	1,210	920	820	574	8,487

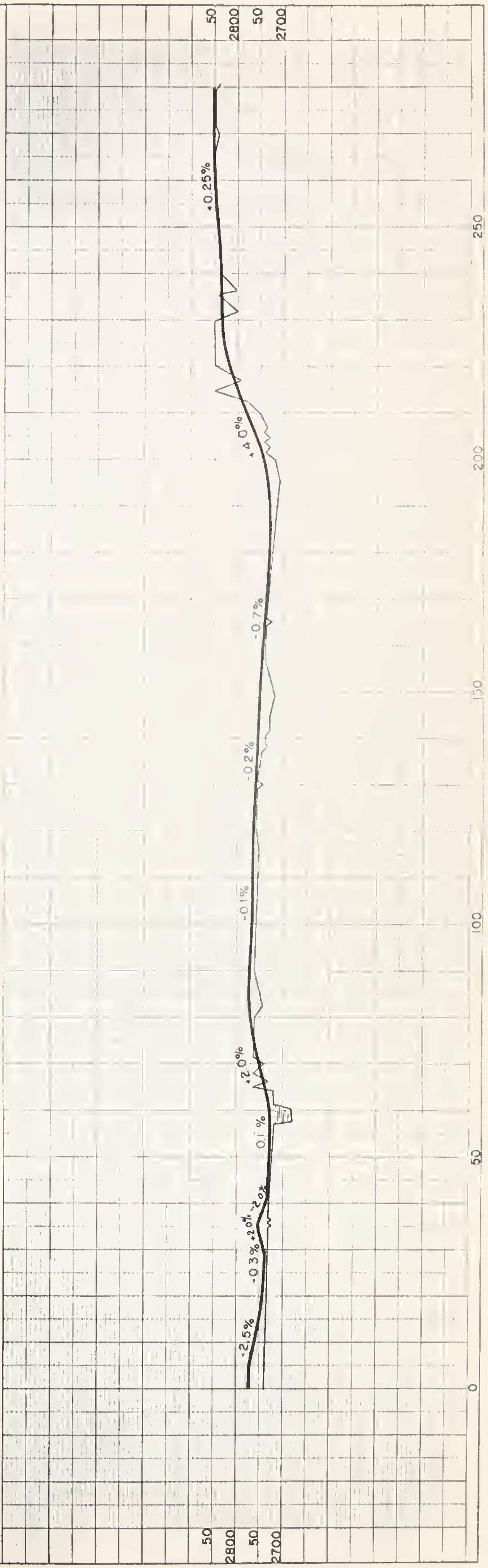
HYSHAM HILLS VICINITY

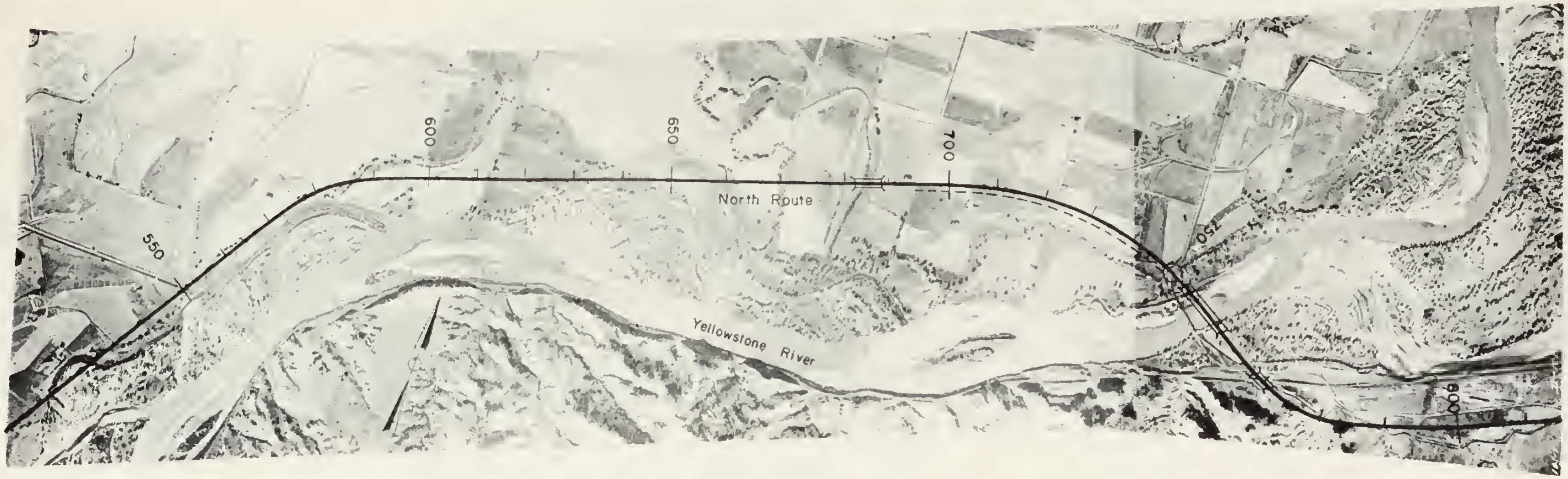
PRELIMINARY COST ESTIMATE

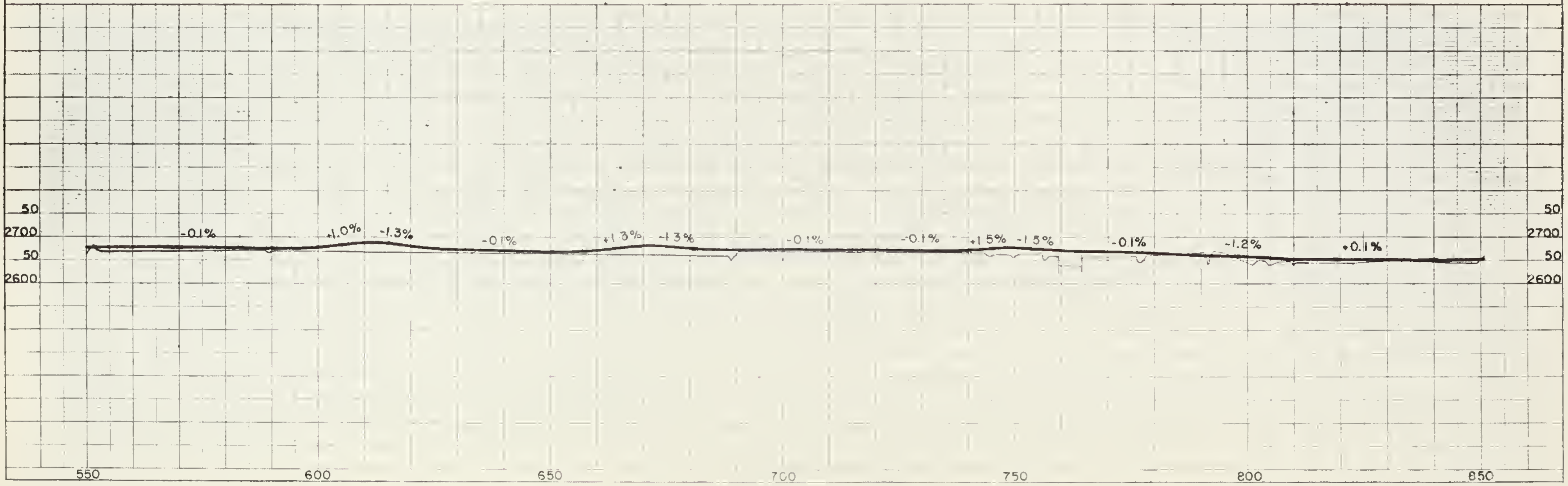
SOUTH ROUTE
ALTERNATE LOCATION 2

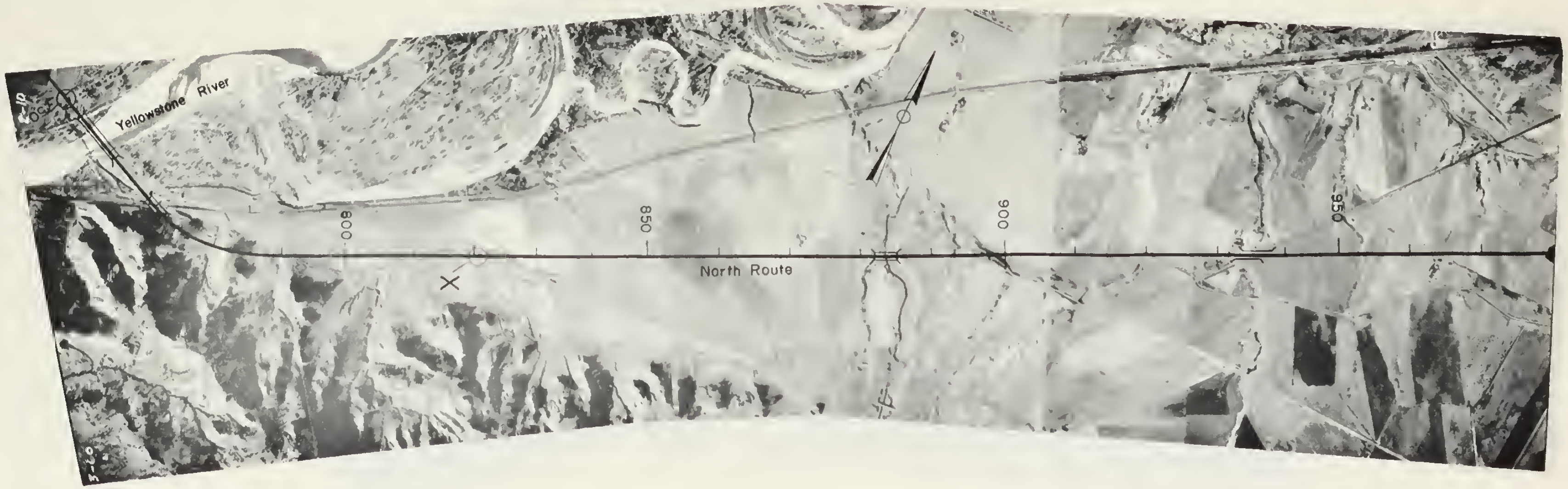
Section	A - B	B - C	C - D	D - E	E - F	F - G	G2 - H2	H2 - I2	I2 - K2		TOTAL
Length	0.530	2.311	3.126	3.389	5.170	3.560	4.780	2.929	6.636		32.431
Number of Lanes	2	2	2	2	4	2	2	2	2		
ITEM	COST (1,000 DOLLARS)										
Utility Adjustments	--	18	--	--	--	---	--	18	2		38
Grade & Drain	15	328	413	132	793	122	283	183	791		3,060
Base & Surfacing	39	145	196	210	579	221	296	190	435		2,311
Railroad Grade Separations	--	--	--	--	--	--	--	--	--		--
Highway Grade Separations	--	--	--	--	--	--	--	132	--		132
Interchanges	--	158	124	138	--	--	159	--	153		732
Bridges	--	--	354	--	--	38	--	38	--		430
Miscellaneous	2	16	12	13	58	23	36	8	50		218
Subtotal of Construction	56	665	1,099	493	1,430	404	774	569	1,431		6,921
Preliminary Engineering	3	32	53	24	69	19	37	27	143		407
Construction Engineering & Contingencies	5	66	110	50	143	52	77	56	69		628
Right of Way	47	76	30	16	9	12	40	25	56		311
Total Estimated Cost	111	839	1,292	583	1,651	487	928	677	1,699		8,267

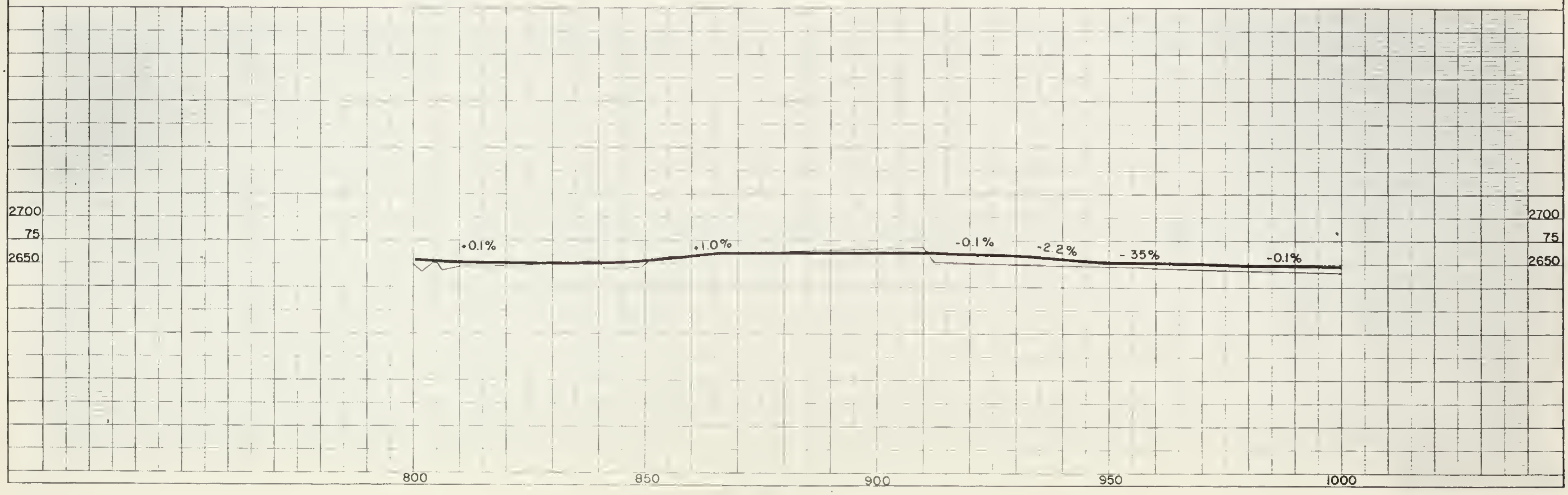

10-14-5?
ROUTE 101-B
1-106
250
200
150
100
50
0+00
North Route
Yellowstone River
CUSTER
T

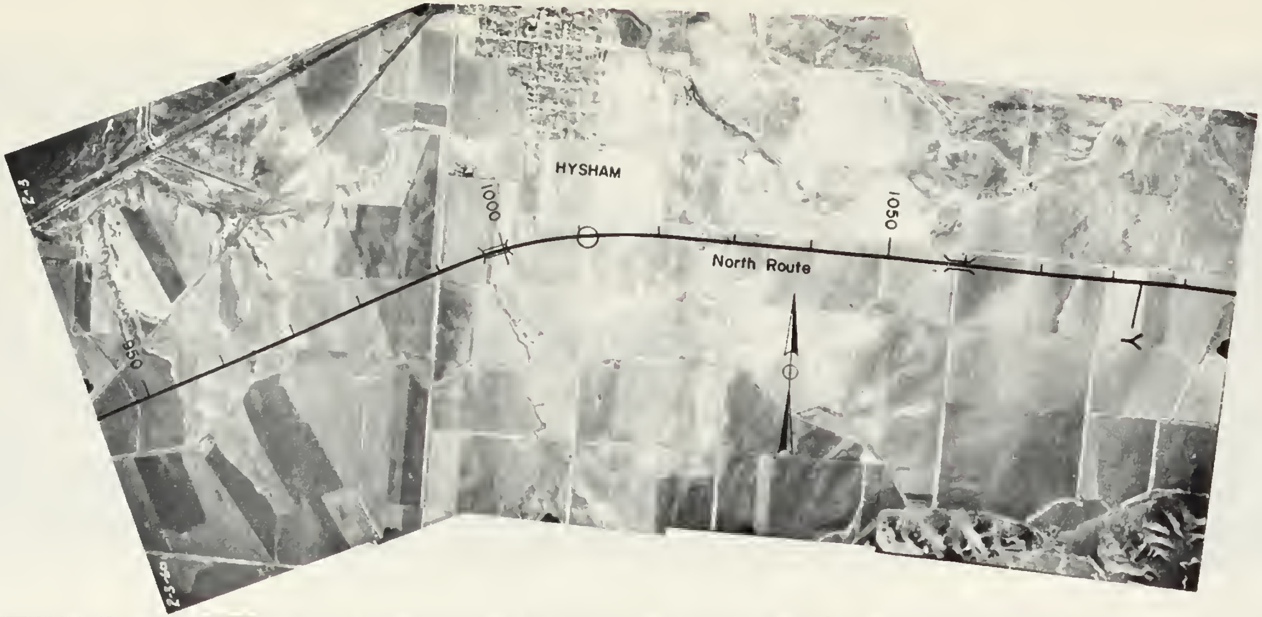

50
2800
50
2700
0
50
100
150
200
250
-2.5%
-0.3%
+2.0%
-2.0%
0.1%
+2.0%
-0.1%
-0.2%
-0.7%
+.40%
+0.25%

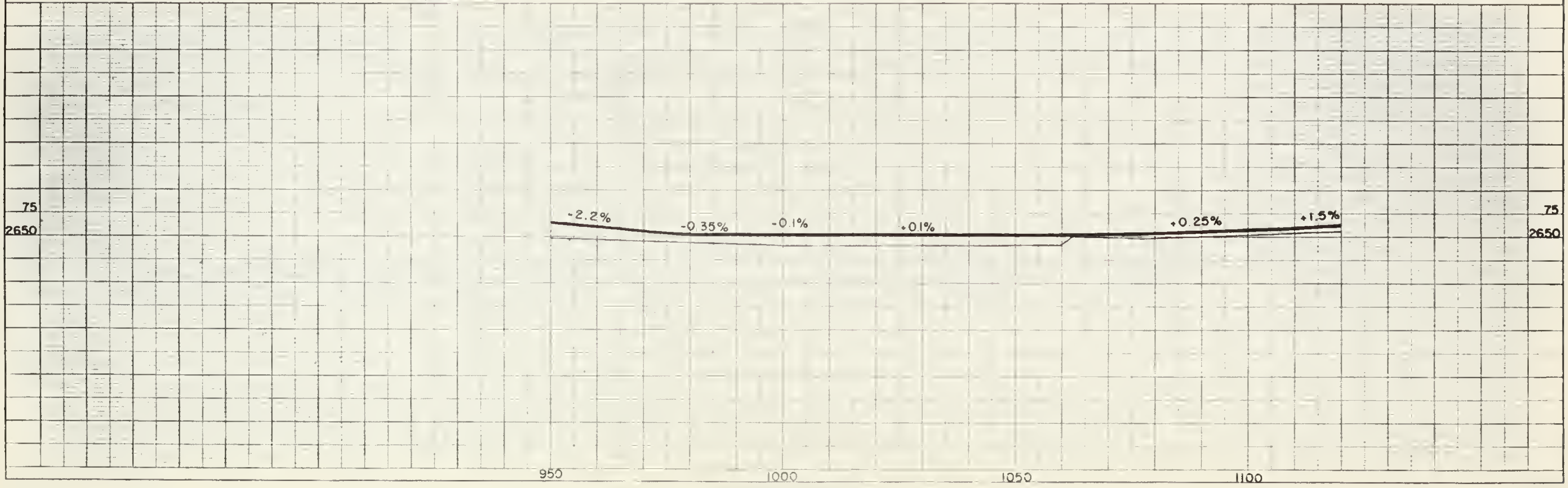

550
600
650
700
750
800
North Route
Yellowstone River

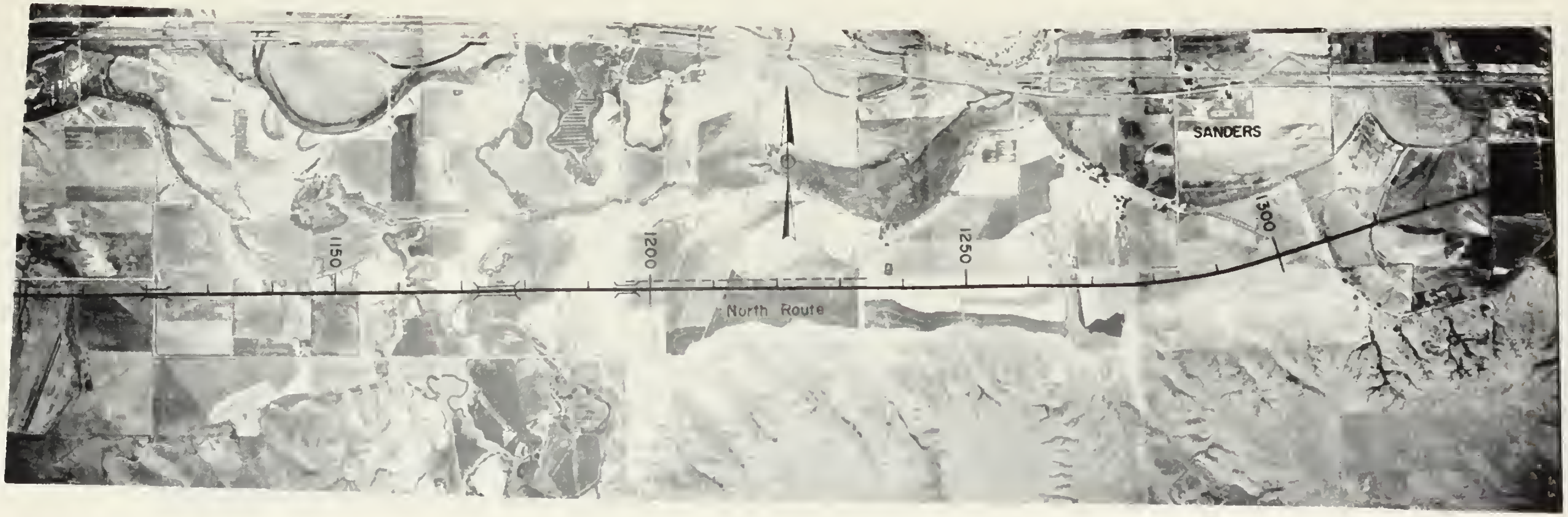

50
2700
50
2600
-0.1%
+1.0%
-1.3%
-0.1%
+1.3%
-1.3%
-0.1%
-0.1%
+1.5%
-1.5%
-0.1%
-1.2%
+0.1%
550
600
650
700
750
800
850

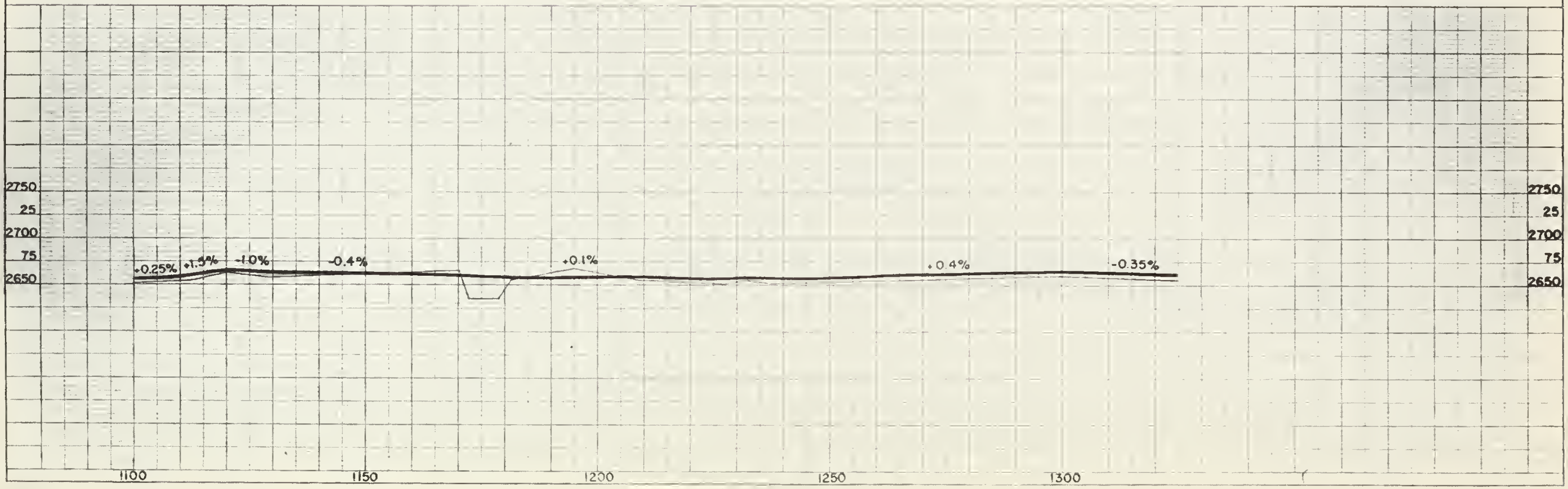

Yellowstone River
800
850
900
950
North Route

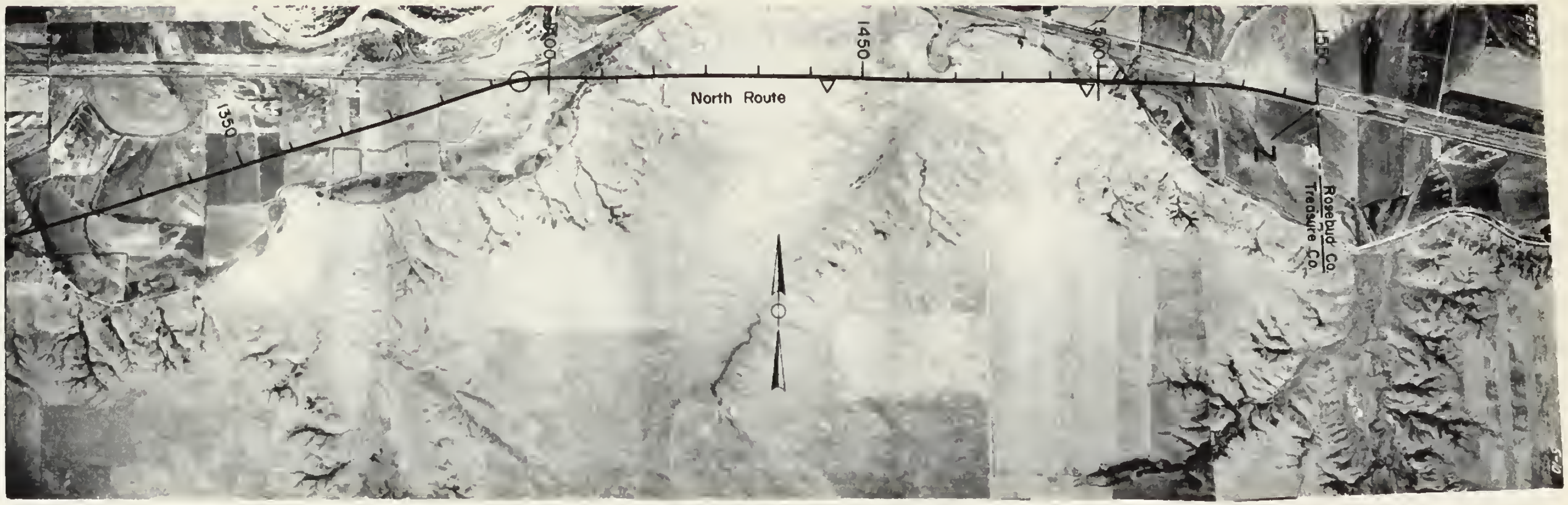

2700
75
2650
+0.1%
+1.0%
-0.1%
-2.2%
-35%
-0.1%
2700
75
2650
800
850
900
950
1000

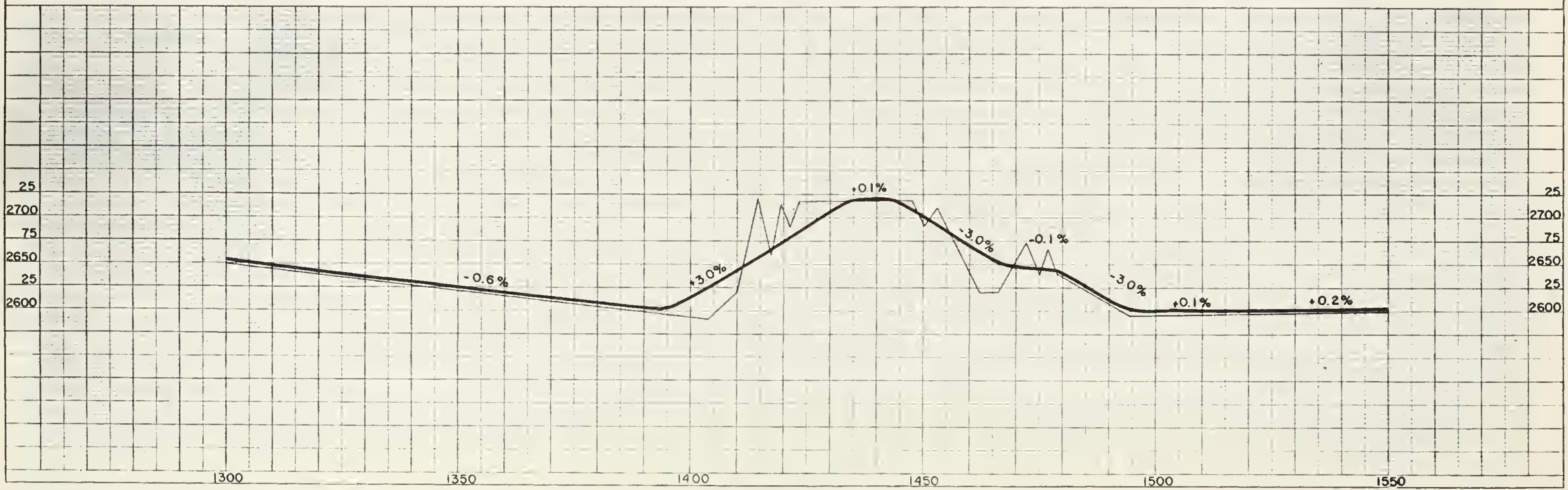

HYSHAM
North Route
950
1000
1050
Y

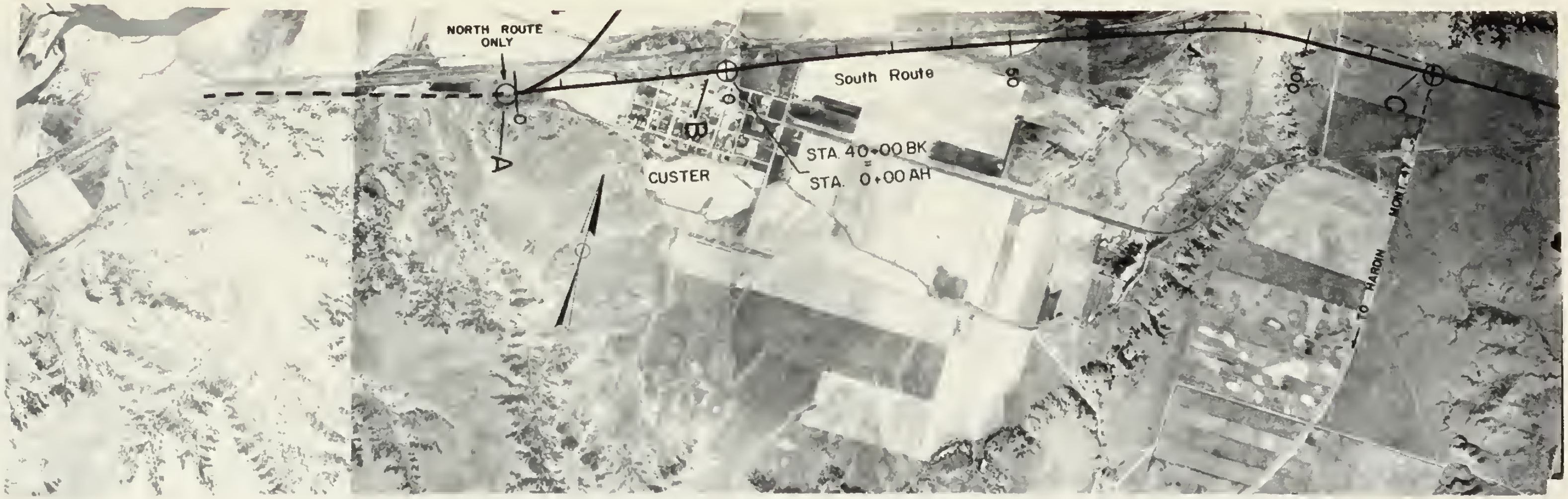

75
2650
-2.2%
-0.35%
-0.1%
+0.1%
+0.25%
+1.5%
950
1000
1050
1100

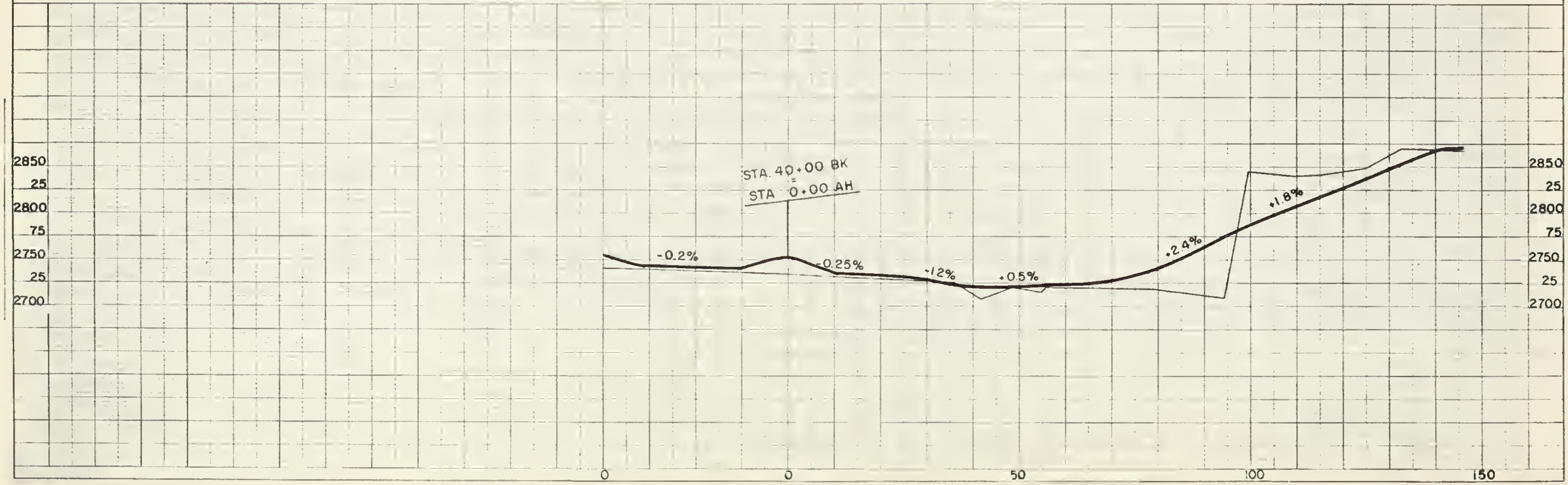

SANDERS
North Route
1150
1200
1250
1300

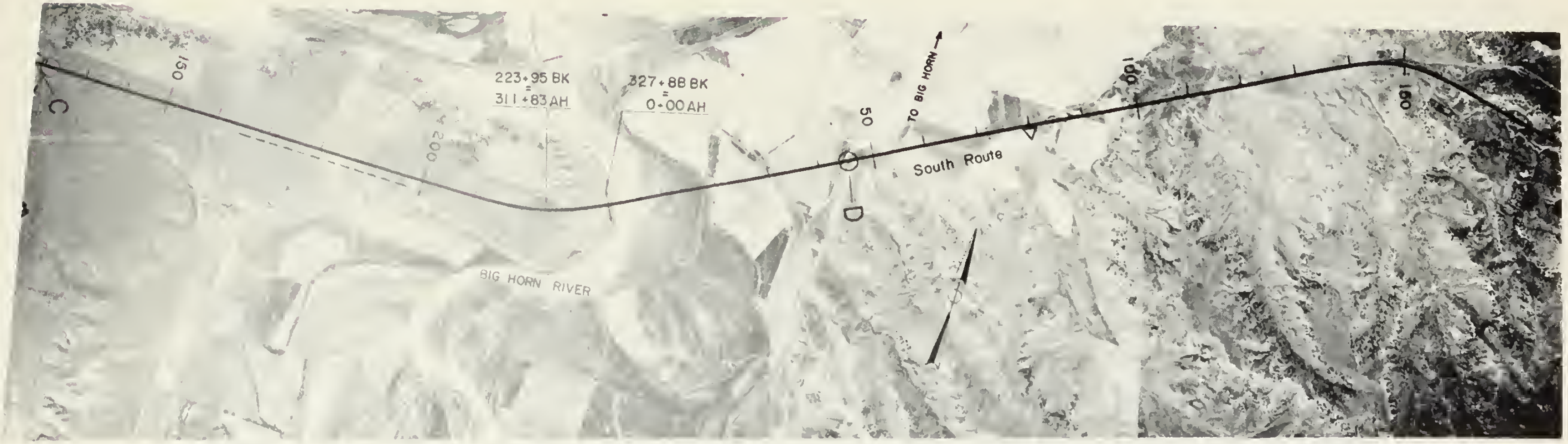

2750
25
2700
75
2650
+0.25%
+1.5%
-1.0%
-0.4%
+0.1%
+0.4%
-0.35%
1100
1150
1200
1250
1300

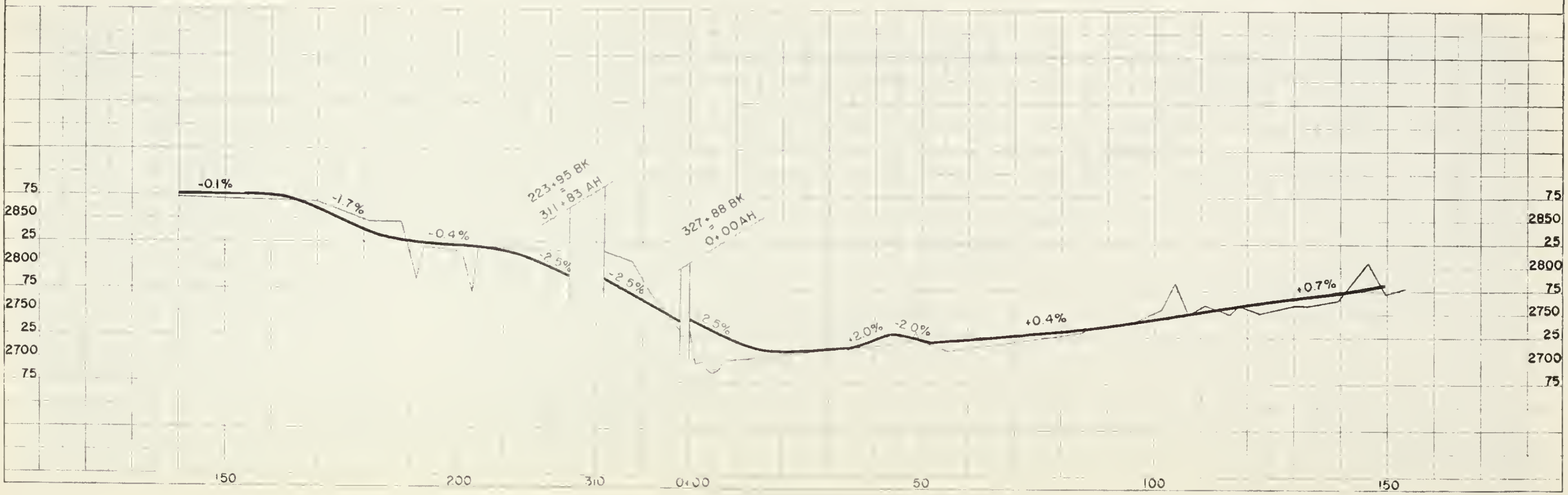

1-21-58
5-10
1350
1400
1450
1500
1550
North Route
Z
Rosebud Co.
Treasure Co.

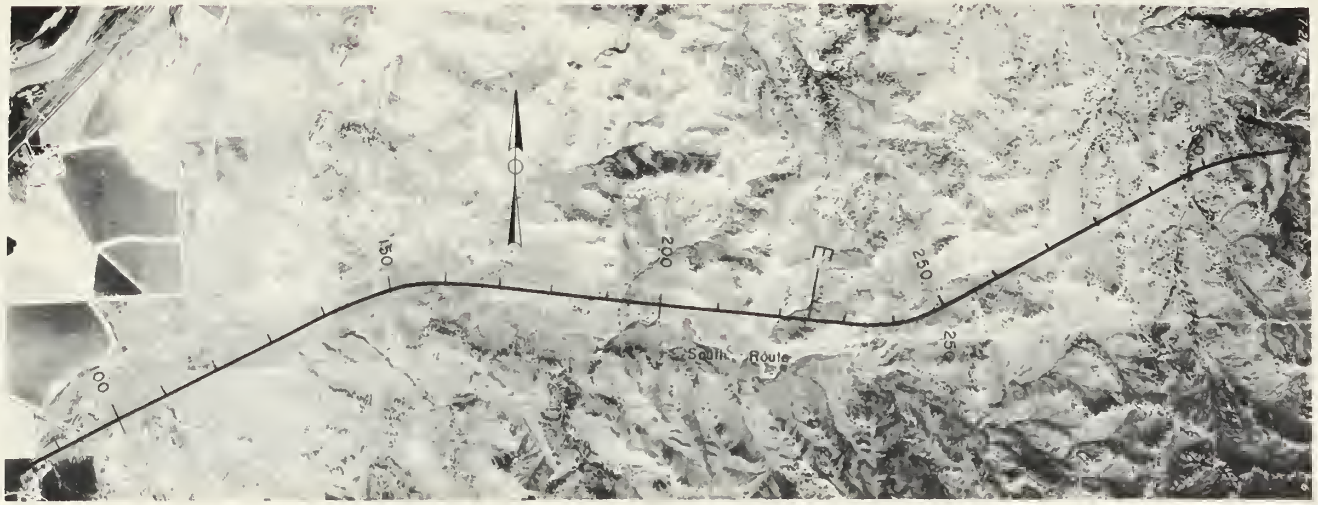

25
2700
75
2650
25
2600
-0.6%
+3.0%
+0.1%
-3.0%
-0.1%
-3.0%
+0.1%
+0.2%
1300
1350
1400
1450
1500
1550

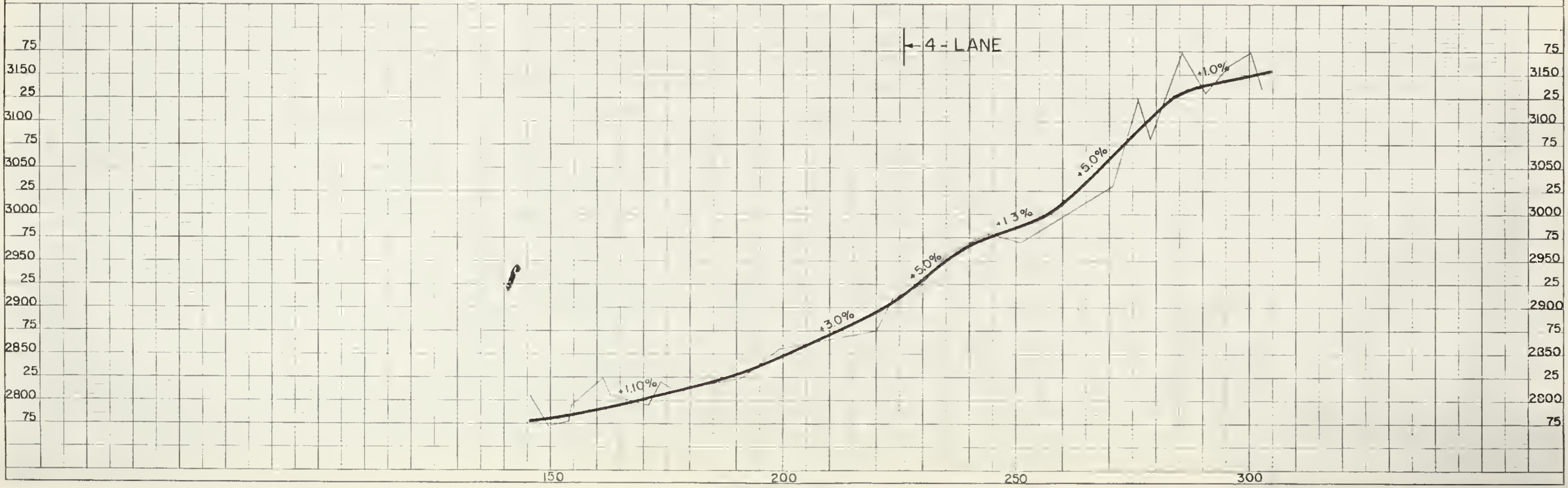

NORTH ROUTE ONLY
A
0
B
0
CUSTER
South Route
STA. 40+00 BK
=
STA. 0+00 AH
50
100
C
MONT. 47
TO HARDIN

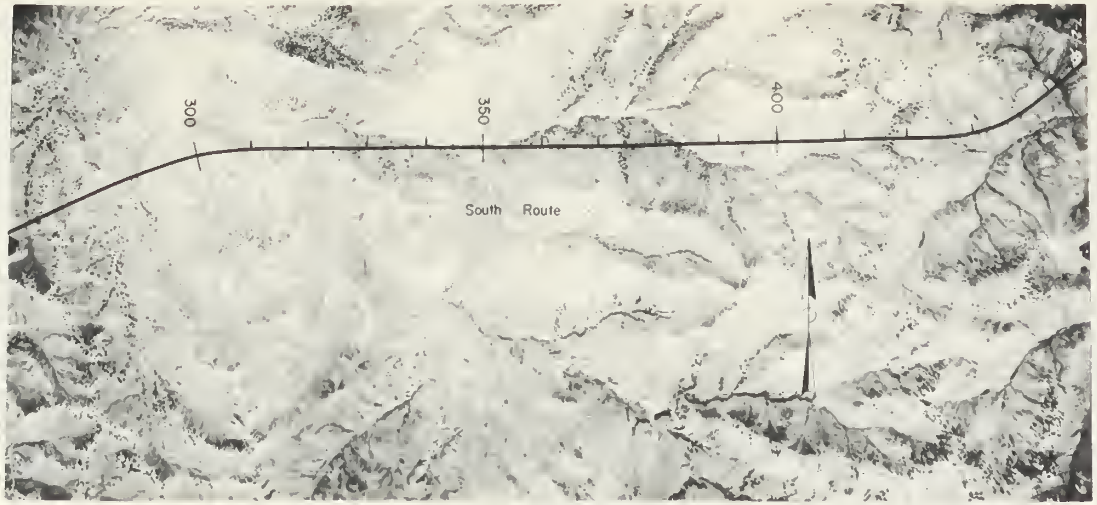

STA. 40+00 BK
=
STA 0+00 AH
-0.2%
-0.25%
-1.2%
+0.5%
+2.4%
+1.8%
2850
25
2800
75
2750
25
2700
0
0
50
100
150

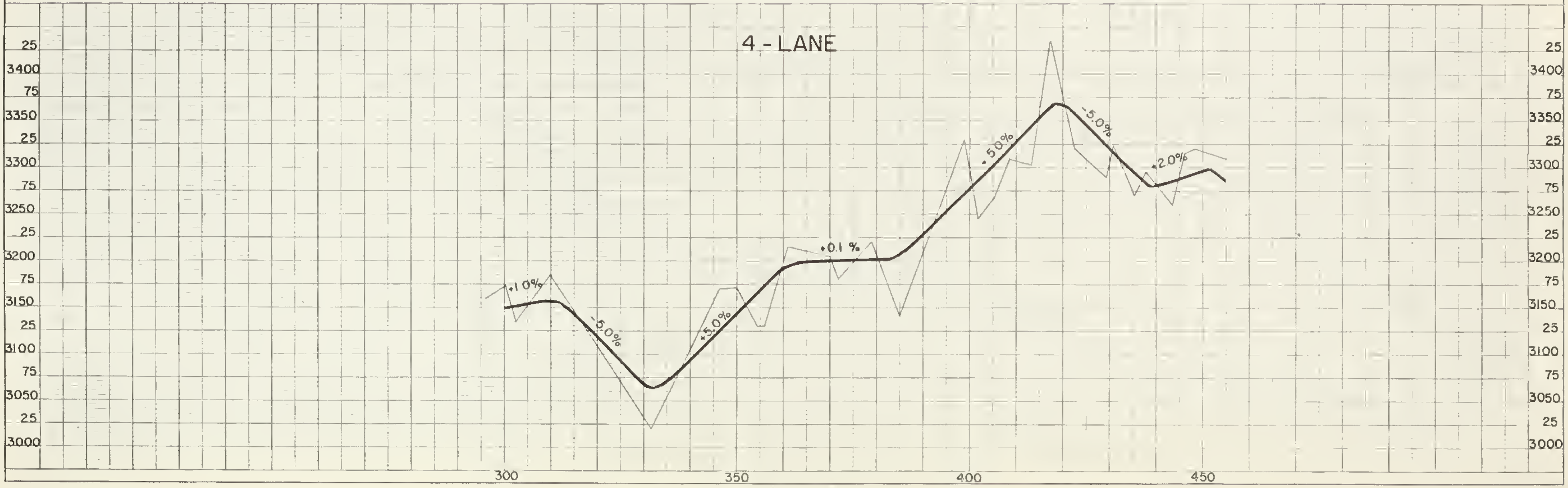

C
150
200
223+95 BK
=
311+83 AH
327+88 BK
=
0+00 AH
50
TO BIG HORN
D
South Route
100
150
BIG HORN RIVER

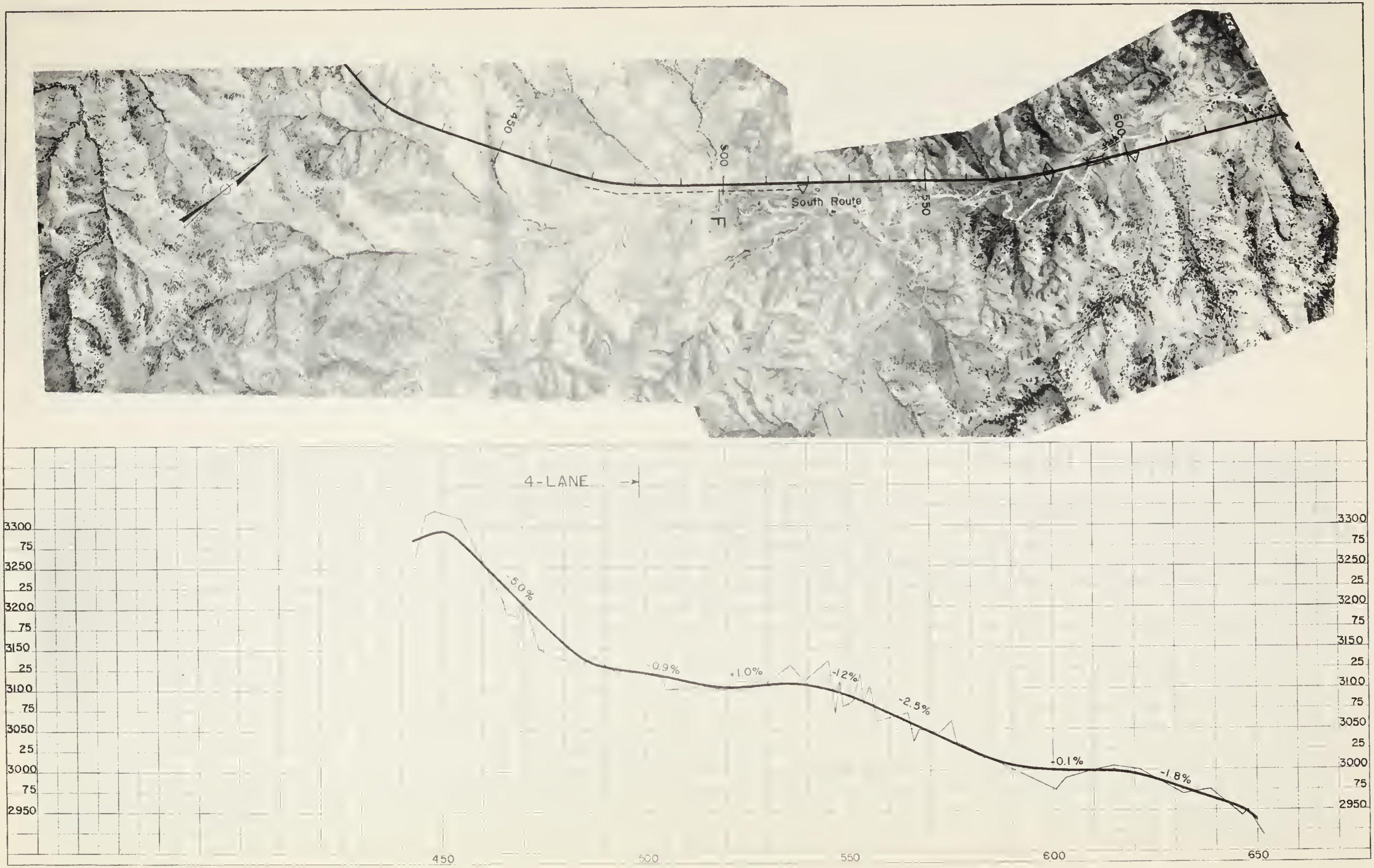

75
2850
25
2800
75
2750
25
2700
75
-0.1%
-1.7%
-0.4%
223+95 BK
=
311+83 AH
-2.5%
-2.5%
327+88 BK
=
0+00 AH
2.5%
+2.0%
-2.0%
+0.4%
+0.7%
150
200
310
0+00
50
100
150

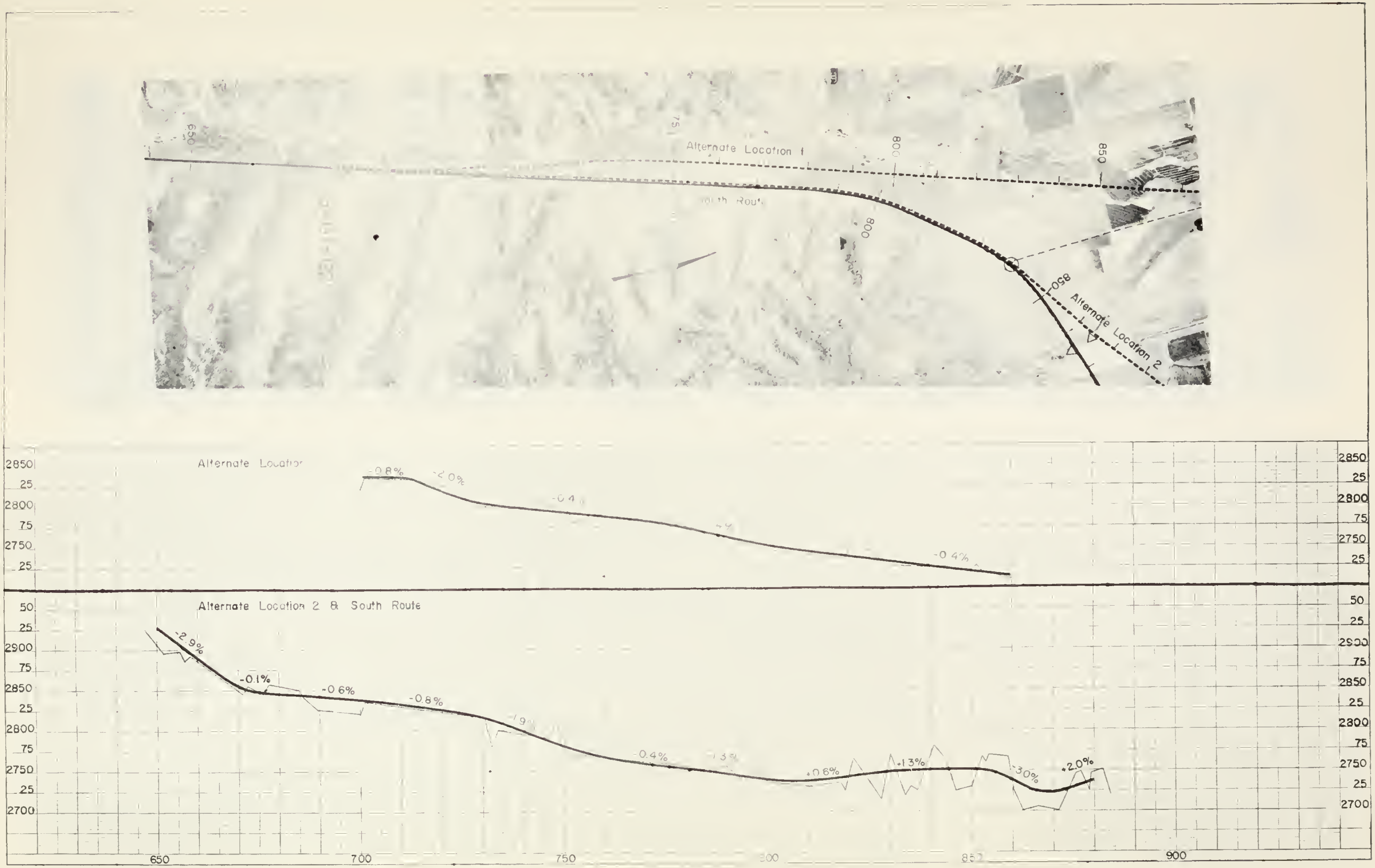

100
150
200
250
250
300
South Route

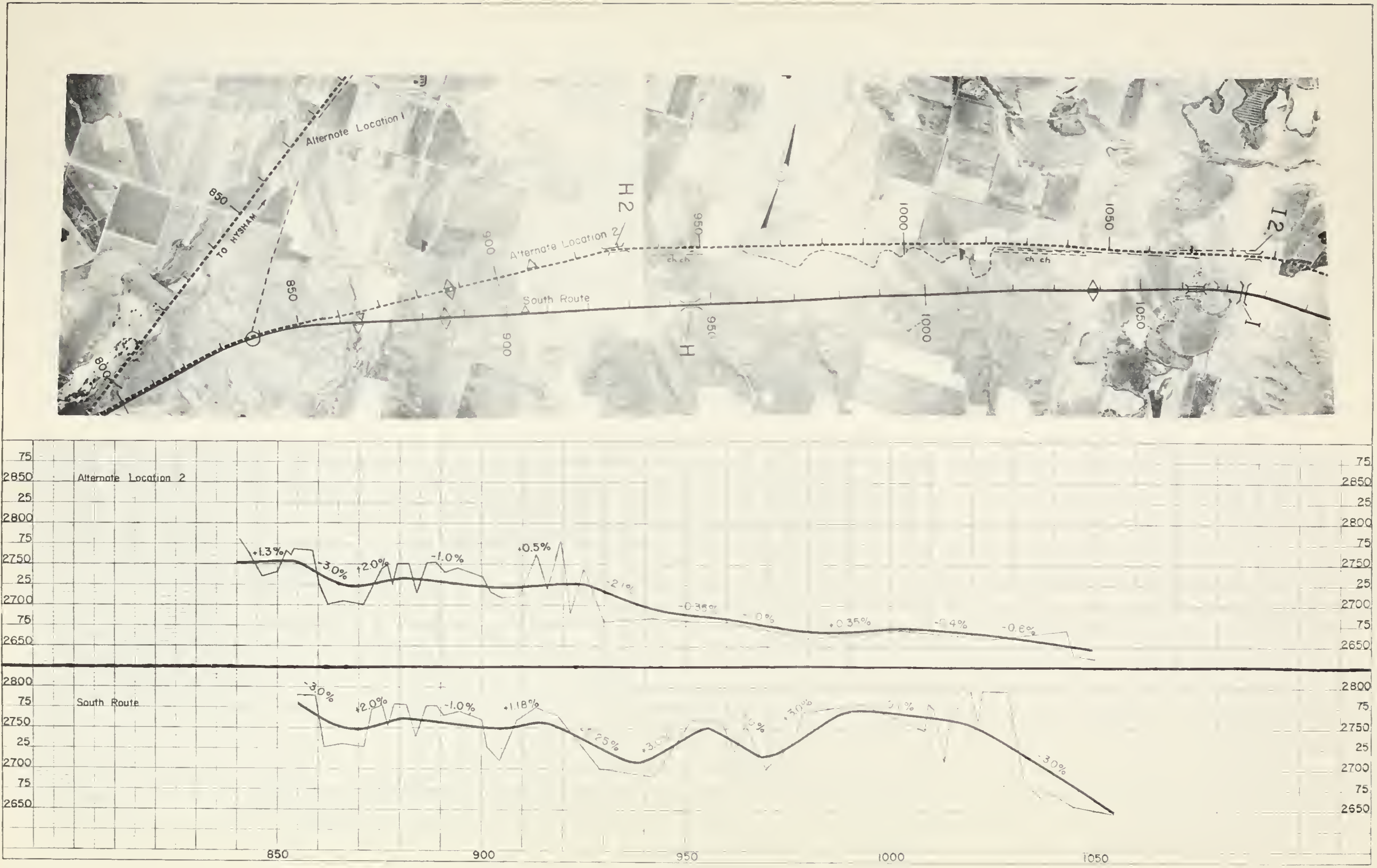

4 - LANE
+1.10%
+3.0%
+5.0%
+1.3%
+5.0%
+1.0%
75
3150
25
3100
75
3050
25
3000
75
2950
25
2900
75
2850
25
2800
75
150
200
250
300

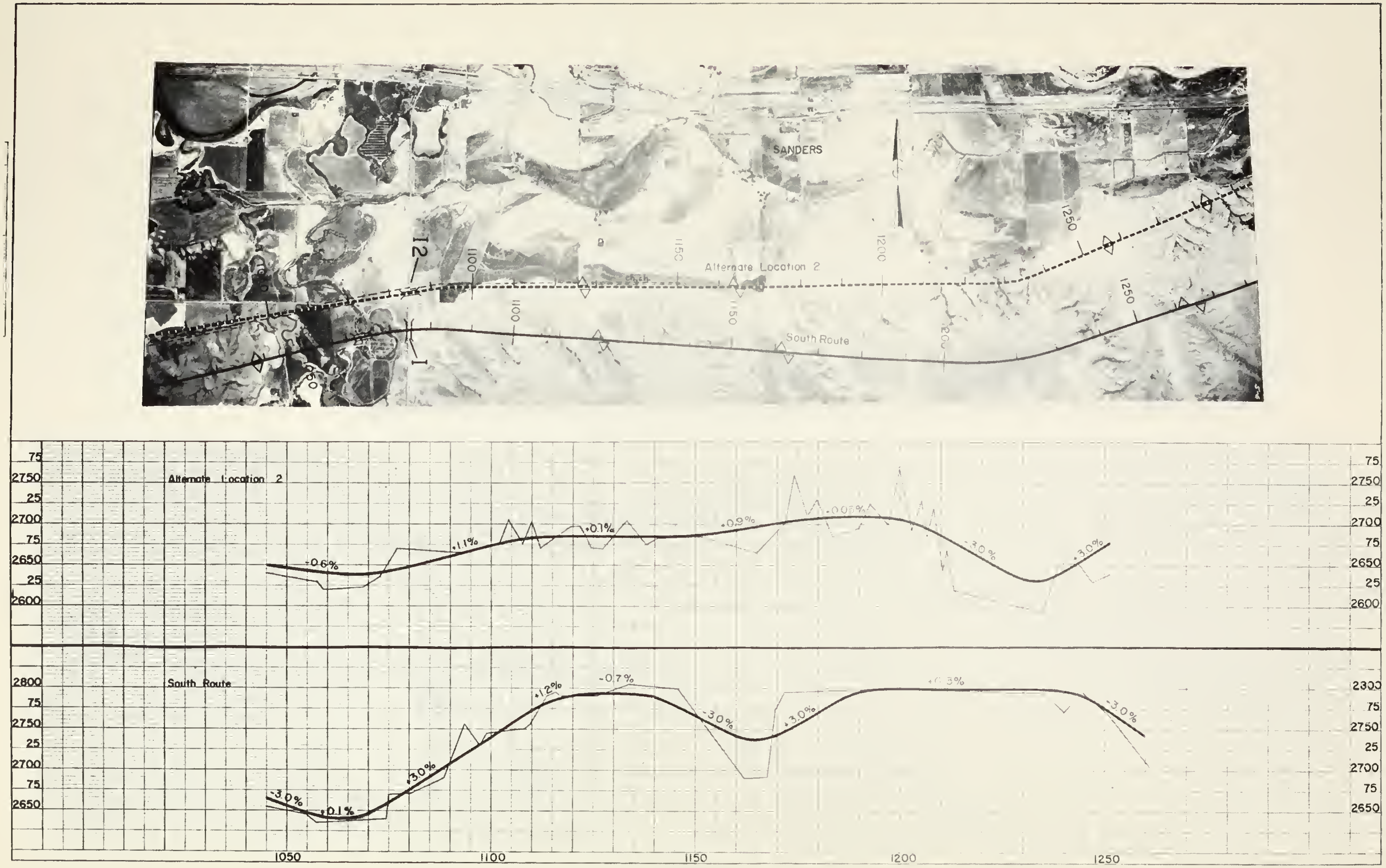

300
350
400
South Route

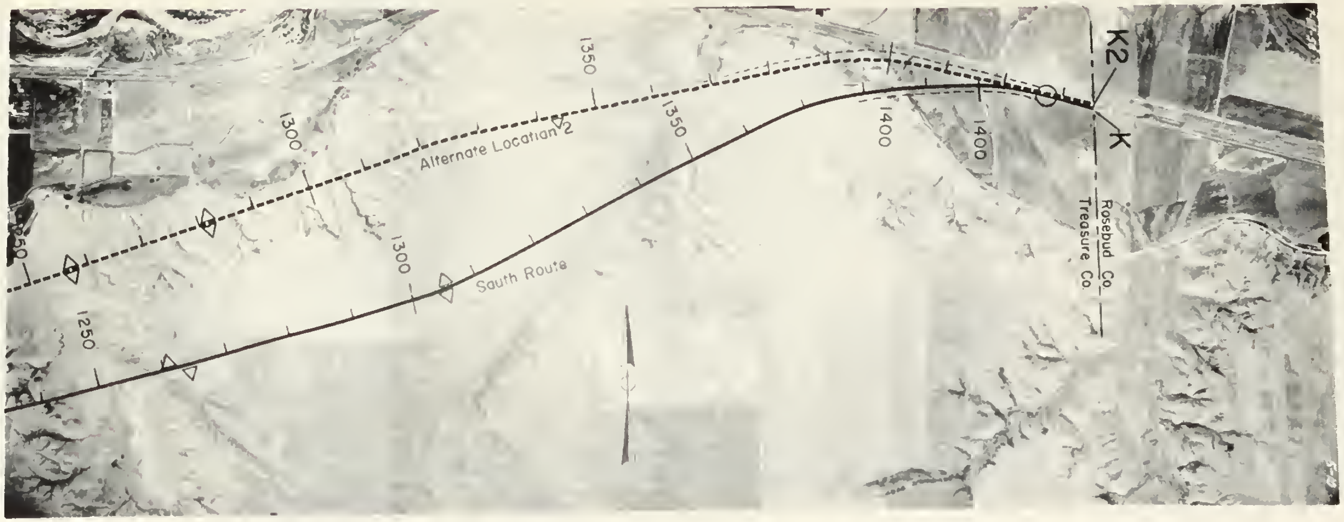

4 - LANE
25
3400
75
3350
25
3300
75
3250
25
3200
75
3150
25
3100
75
3050
25
3000
+1.0%
-5.0%
+5.0%
+0.1 %
+5.0%
-5.0%
+2.0%
300
350
400
450


450
500
550
600
South Route
F
4-LANE
-5.0%
-0.9%
+1.0%
-1.2%
-2.5%
-0.1%
-1.8%
3300
75
3250
25
3200
75
3150
25
3100
75
3050
25
3000
75
2950
450
500
550
600
650

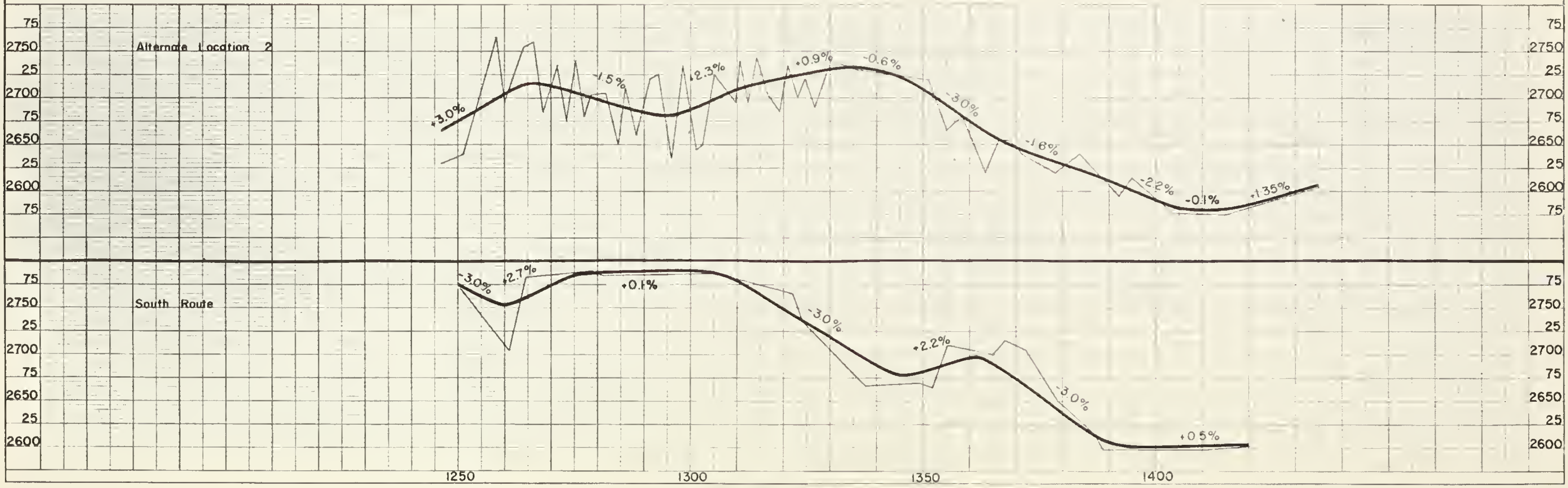

Alternate Location 1
South Route
Alternate Location 2
650
75
800
850
800
850
Alternate Location
-0.8%
-2.0%
-0.4
-0.4%
Alternate Location 2 & South Route
-2.9%
-0.1%
-0.6%
-0.8%
-1.9%
-0.4%
-1.3%
+0.6%
+1.3%
-3.0%
+2.0%
2850
25
2800
75
2750
25
50
25
2900
75
2850
25
2800
75
2750
25
2700
650
700
750
800
850
900


Alternate Location I
850
TO HYSHAM
800
850
900
Alternate Location 2
H2
950
ch ch
1000
1050
I2
South Route
900
H
950
1000
1050
I
Alternate Location 2
+1.3%
-3.0%
+2.0%
-1.0%
+0.5%
-2.1%
-0.35%
-1.0%
+0.35%
-0.4%
-0.6%
South Route
-3.0%
+2.0%
-1.0%
+1.18%
-2.25%
+3.0%
-3.0%
+3.0%
-3.0%
2850
2800
2750
2700
2650
75
25
850
900
950
1000
1050

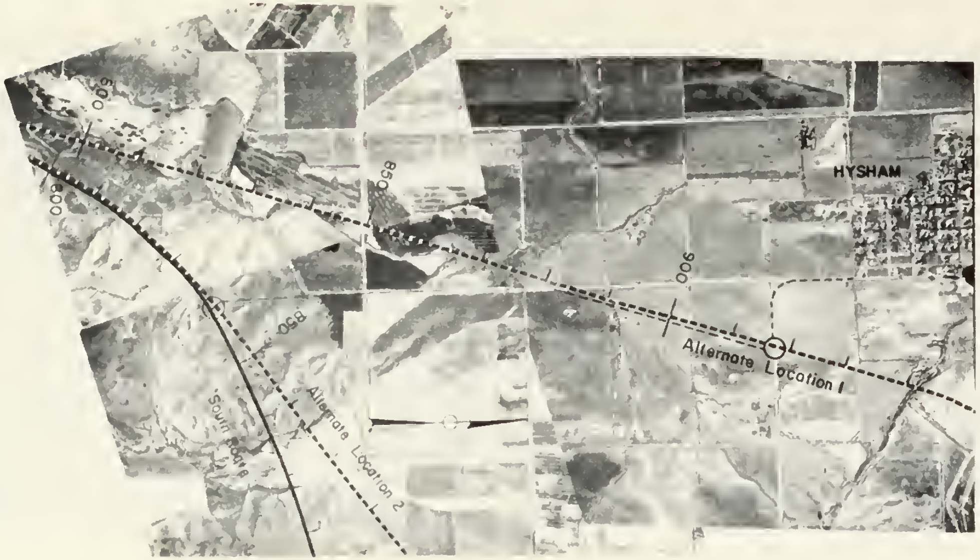

SANDERS
Alternate Location 2
South Route
I2
I
1050
1100
1150
1200
1250
Alternate Location 2
-0.6%
+1.1%
+0.1%
+0.9%
-0.05%
-3.0%
+3.0%
South Route
-3.0%
+0.1%
+3.0%
+1.2%
-0.7%
-3.0%
+3.0%
+0.3%
-3.0%
75
2750
25
2700
75
2650
25
2600
2800
75
2750
25
2700
75
2650
2300
1050
1100
1150
1200
1250

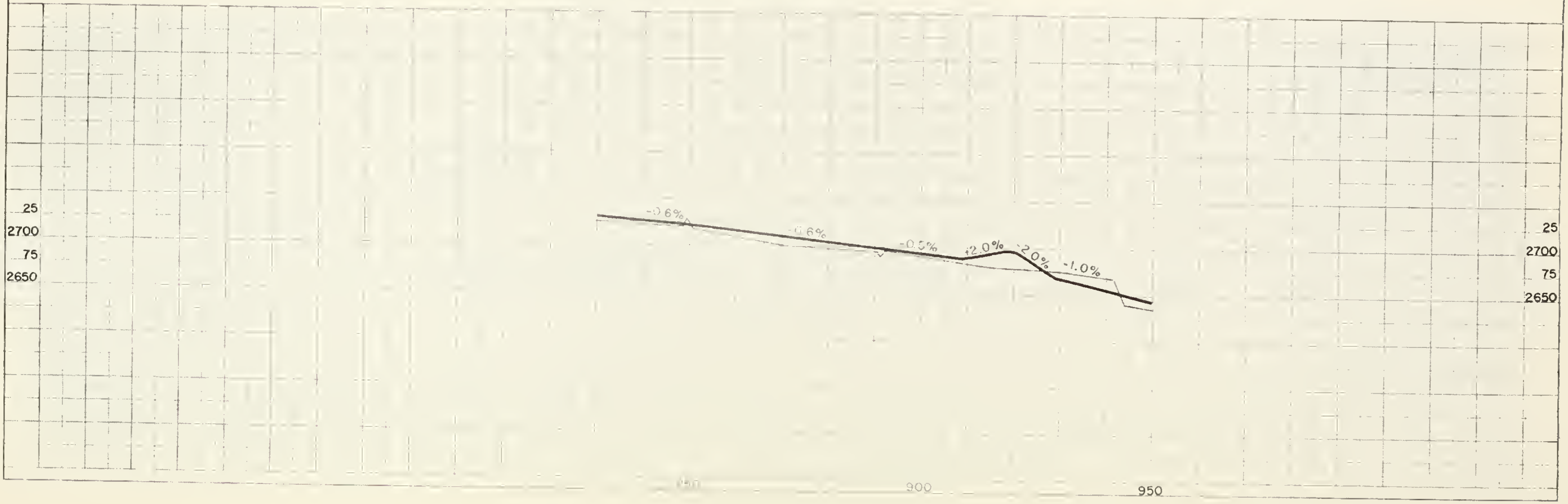


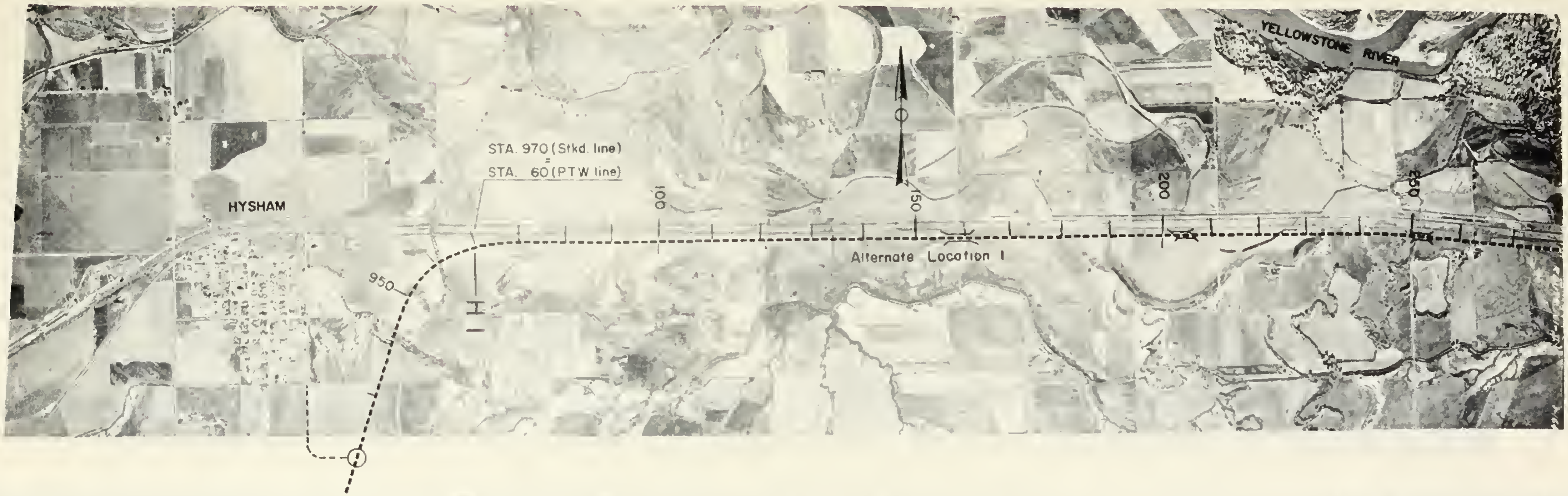
K2
K
Rosebud Co.
Treasure Co.
1400
1400
1350
1350
1300
1300
1250
1250
Alternate Location 2
South Route

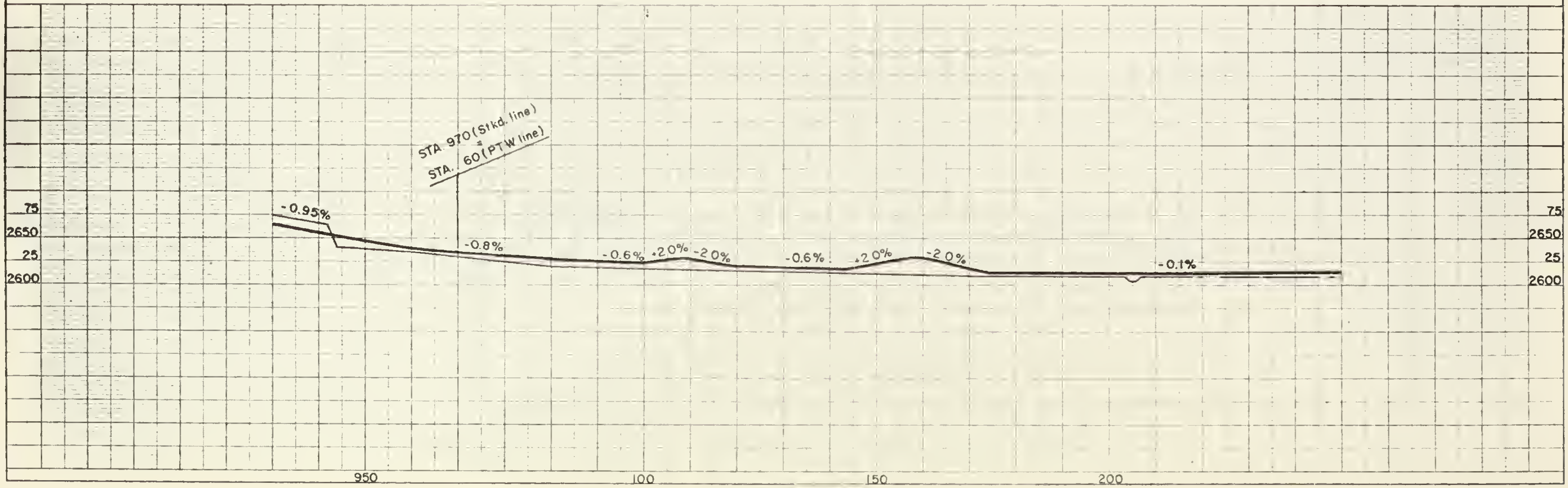


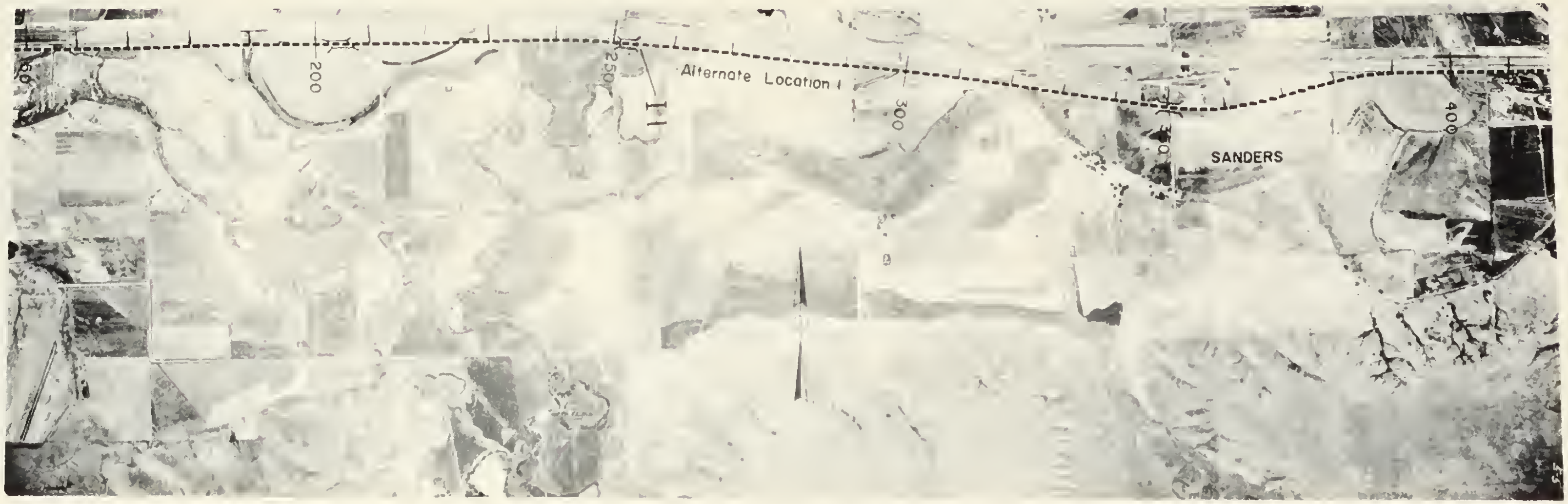
Alternate Location 2
+3.0%
-1.5%
+2.3%
+0.9%
-0.6%
-3.0%
-1.6%
-2.2%
-0.1%
+1.35%
South Route
-3.0%
+2.7%
+0.1%
-3.0%
+2.2%
-3.0%
+0.5%
75
2750
25
2700
75
2650
25
2600
75
1250
1300
1350
1400

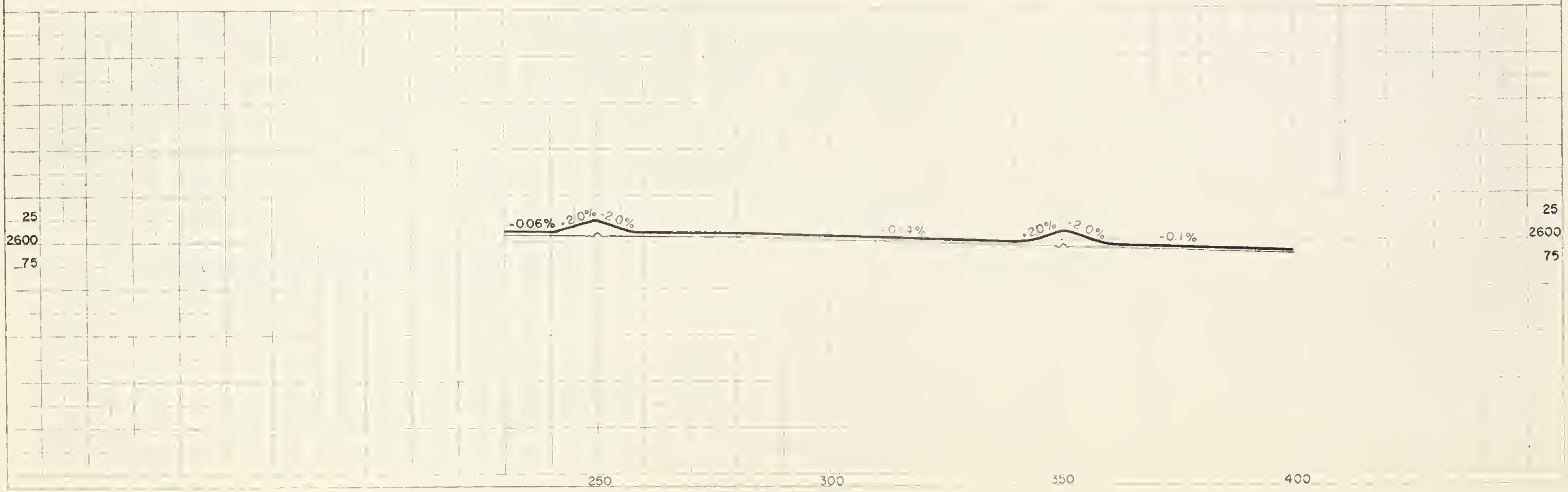

HYSHAM
Alternate Location 1
Alternate Location 2
South Route
800
800
850
850
900

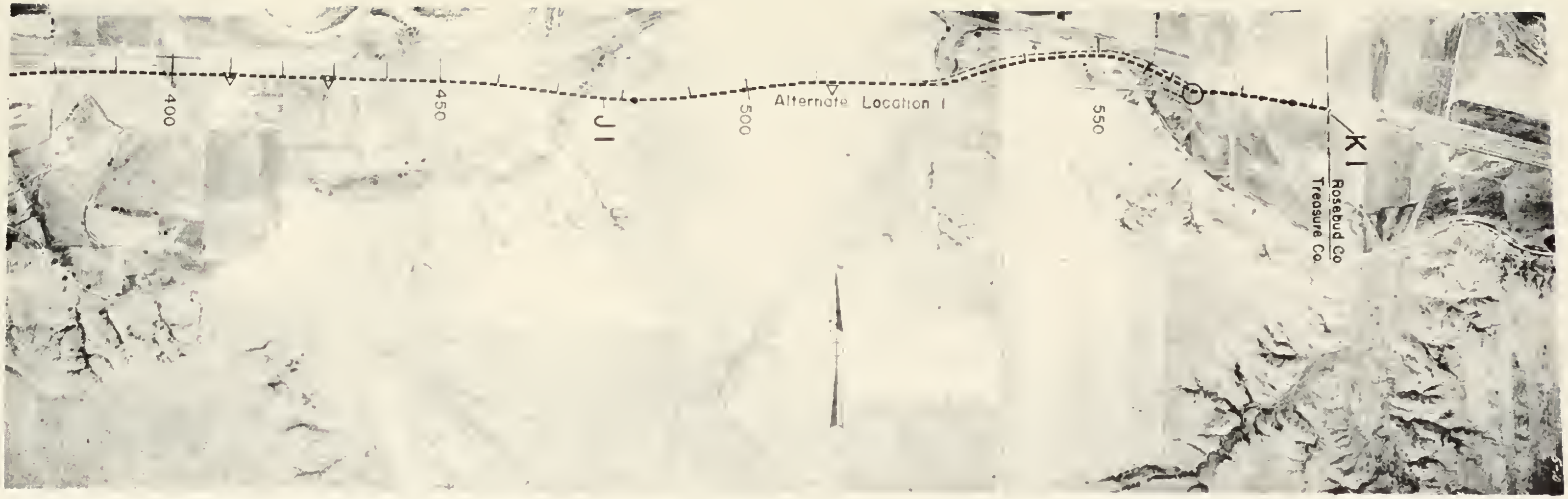

25
2700
75
2650
-0.6%
-0.6%
-0.5%
+2.0%
-2.0%
-1.0%
850
900
950

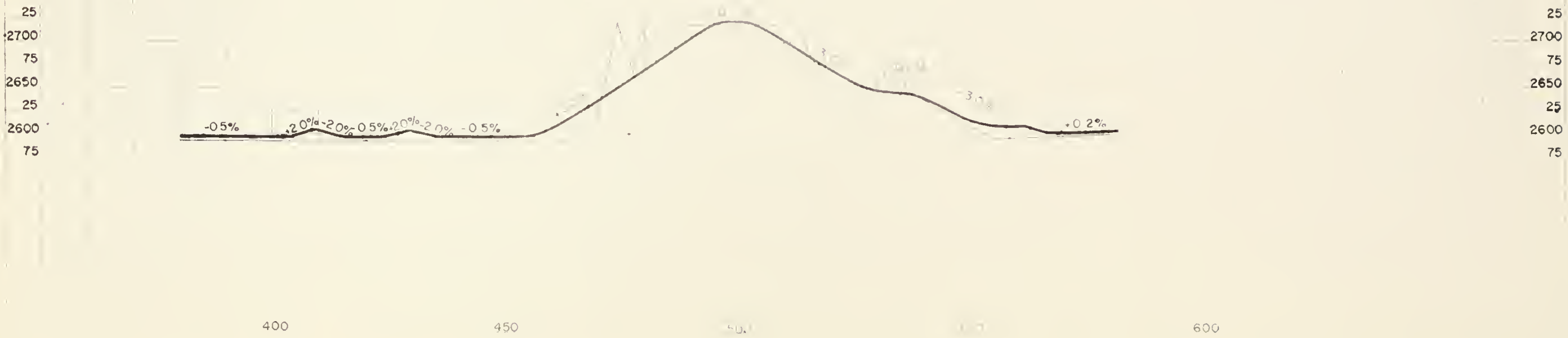

YELLOWSTONE RIVER
HYSHAM
STA. 970 (Stkd. line)
=
STA. 60 (PTW line)
Alternate Location 1
H 1
950
100
150
200
250


STA. 970 (Stkd. line)
=
STA. 60 (PTW line)
-0.95%
-0.8%
-0.6%
+2.0%
-2.0%
-0.6%
+2.0%
-2.0%
-0.1%
75
2650
25
2600
950
100
150
200


200
250
Alternate Location I
300
350
SANDERS
400


25
2600
75
-0.06%
+2.0%
-2.0%
-0.4%
+2.0%
-2.0%
-0.1%
25
2600
75
250
300
350
400


400
450
J1
500
Alternate Location 1
550
K1
Rosebud Co
Treasure Co


25
2700
75
2650
25
2600
75
-0.5%
+2.0%
-2.0%
-0.5%
+2.0%
-2.0%
-0.5%
+0.2%
400
450
600